SUMMER 1961 FIFTY CENTS

The Farm QUARTERLY

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APR 25 1961
HOME READING

New field watering of hay

Linear programming — a way to balance farm enterprises

Harvest with Confidence

Look inside a GLEANER combine—and see why

The Great Silver Fleet of GLEANER combines

Model A	10, 12 or 14-ft. for all size farms
Big C	14, 16, 18 or 20-ft. "Giant of the Harvest"
Model AH	14-ft. with automatic leveling for hillsides
Model B	12-ft. Rice Special
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Men who know good combining have faith in GLEANER combines.

When wheat is down . . . sorghum is thick . . . beans are tangled . . . corn is tough to combine . . . there is a great feeling of confidence when the familiar silver GLEANER combine rolls into the field.

A close look inside the new low-silhouette GLEANER combines reveals the reasons why they keep rolling and save the crop.

Like a good watch, quality shows inside and out. The difference is plain to see—in the famous *down-front threshing cylinder* and *two-fan cleaning*. Follow the flow of grain from sickle through 13 feet of separating length to big-capacity bin.

Trust your harvesting to the combines that *keep rolling*. Get the inside story from your Allis-Chalmers dealer. *Allis-Chalmers, Farm Equipment Division, Milwaukee 1, Wisconsin.*

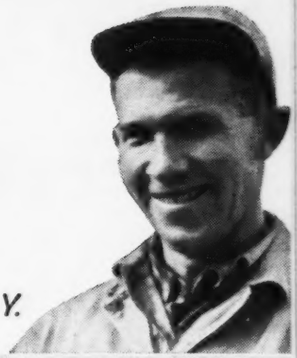
Get the dollar-making difference with ALLIS-CHALMERS

GLEANER is an Allis-Chalmers trademark.

GOODYEAR "EXTRA HAND" SERVICE AT WORK:

"Getting back on the job in an hour saved me $250"

reports Robert McNinch, Mac-Beth Farm, Belmont, N.Y.



DETROIT PUBLIC LIBRARY
APR 25 1961
HOME READING

WITHIN MINUTES OF A TROUBLE-CALL from Bob McNinch, M. & W. Tire Co. "rep" Alvin Jordan reached Mac-Beth Farm. He quickly installed a free "loaner" to replace a tractor tire that had been damaged beyond repair. Just one hour after the accident, the tractor was back planting oats again. According to McNinch, this speedy service saved $250—the wages of his extra field hands who would have been idled the rest of the day without the tractor.

THE NEXT MORNING AT 7 A.M.
Jordan returned to replace the "loaner" with the new Goodyear tire McNinch needed. It was expertly installed—inflated—liquid-weighted, in time for a full day in the field. That's all part of the "Extra Hand" service that has helped keep McNinch a Goodyear tractor tire user for the past 18 years. Another big reason he's a Goodyear fan: Goodyear famed Sure-Grip quality gives him 1,000 hours of peak performance a year—year after year.

IT'S EASY TO SEE WHY farmers the country over are loyal to Goodyear. They know that Sure-Grip Tractor Tires feature super-tough rubbers teamed with exclusive Triple-Tempered cord for bonus mileage. And every mile of it, those ruler-straight, gear-like lugs deliver exceptional traction.

To save money on tractor tires that are the biggest dollar's worth today—or to save time in emergencies through "Extra Hand" service—call your Goodyear dealer!

Goodyear, Farm Tire Department, Akron 16, Ohio.

GOODYEAR "EXTRA HAND" FARM TIRE SERVICE

1. Check, change and repair any type tire.
2. Furnish "loaners" while your tires are being repaired or retreaded.
3. Liquid-weight your tractor tires for maximum traction.
4. Minimize down time through expert help on tire maintenance.
5. Take care of your battery needs.

Sure-Grip—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Lots of good things come from

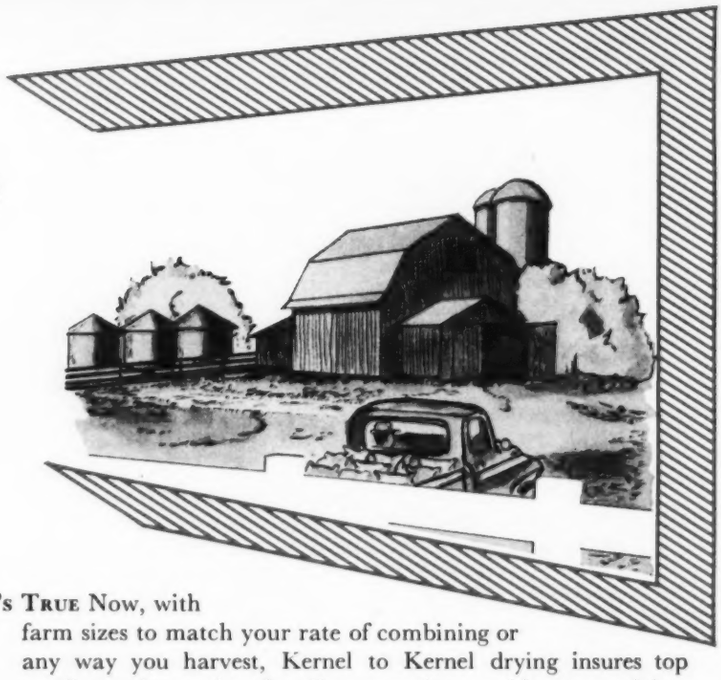
GOODYEAR

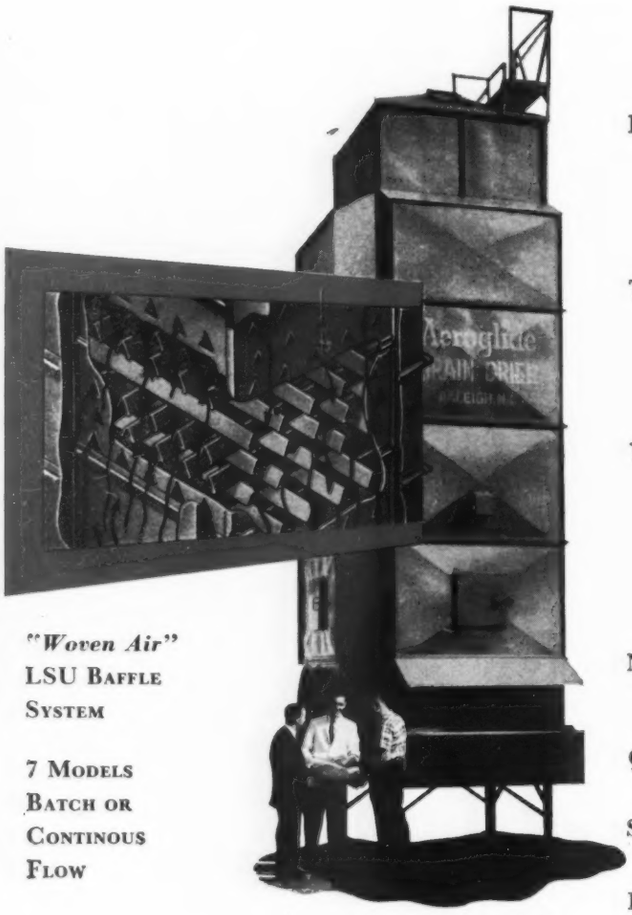
MORE FARMERS PREFER GOODYEAR TRACTOR TIRES THAN ANY OTHER KIND

Choose either the popular 3-T Sure-Grip or extra-quality Traction Sure-Grip tires, both out-in-front performers

NOW!

Terminal Grade Drying on YOUR FARM





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BATCH OR
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IT'S TRUE Now, with farm sizes to match your rate of combining or any way you harvest, Kernel to Kernel drying insures top grading *and* top prices for all your grains — without complaints from hardest to please buyers.

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HI-STOR
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GIVES YOU MORE!

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THE FARM QUARTERLY

Q U A R T E R L Y

Summer 1961, Vol. 16, No. 2

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THE FARM QUARTERLY
22 East Twelfth Street, Cincinnati 10, Ohio

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Fall issue on sale August 6 at all Class A newsstands. Note that Farm Quarterly is being published one month earlier to help you in your pre-season planning.

FIRST OWNER REPORTS on John Deere's

"A Man Can Get More Work Done, Feel Less Tired with a John Deere"

"I got my "4010" in time for corn picking. So far I've worked 125 hours and picked over 200 acres. I like everything about it, but what impresses me most of all is the way the tractor rides and drives. You couldn't ask for easier steering, a smoother PTO, or a better range of speeds. And that seat is by far the finest ever put on a tractor. No question in my mind but what a man can get more work done and feel less tired with a new John Deere than with any other tractor on the market."

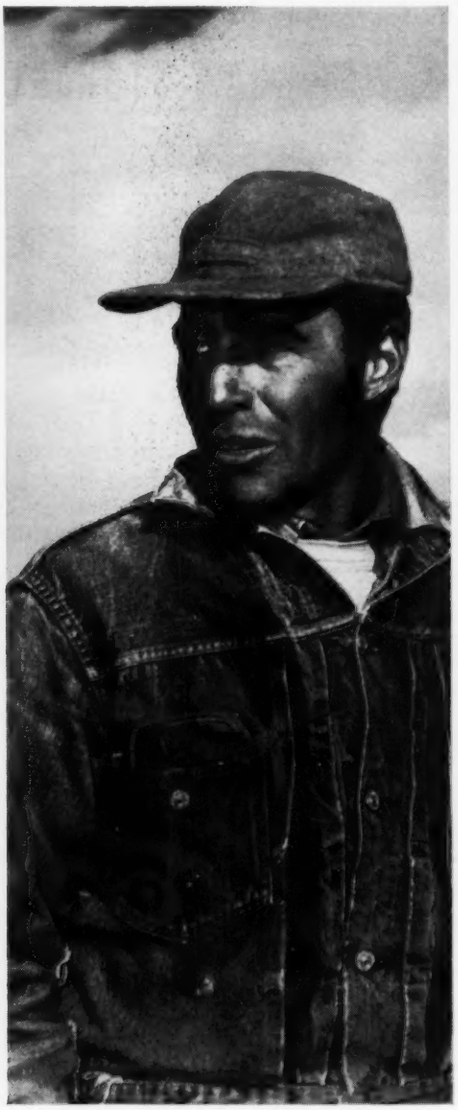
LLOYD WHISTLER, *Ambia, Indiana*

"Plenty Pleased with Performance and Economy of "4010" Tractor"

"We have put 114 hours on this new "4010"—mostly planting wheat, pulling a new RW Disk Harrow ahead of a John Deere Drill. I have kept close tab on both performance and economy and I can say that we are plenty pleased with both. We can really cover the acreage.

"My tractor operators are naturally delighted with the comfort and easy handling of the John Deere, but they save their biggest praise for the hydraulic system. We all go for that variable-horsepower engine and the ease of shifting. The direction reverse is a real 'speeder-upper' on a lot of jobs."

ROBERT MCASKILL, *Altus, Oklahoma*



"The John Deere "3010" Is Everything We Wanted"

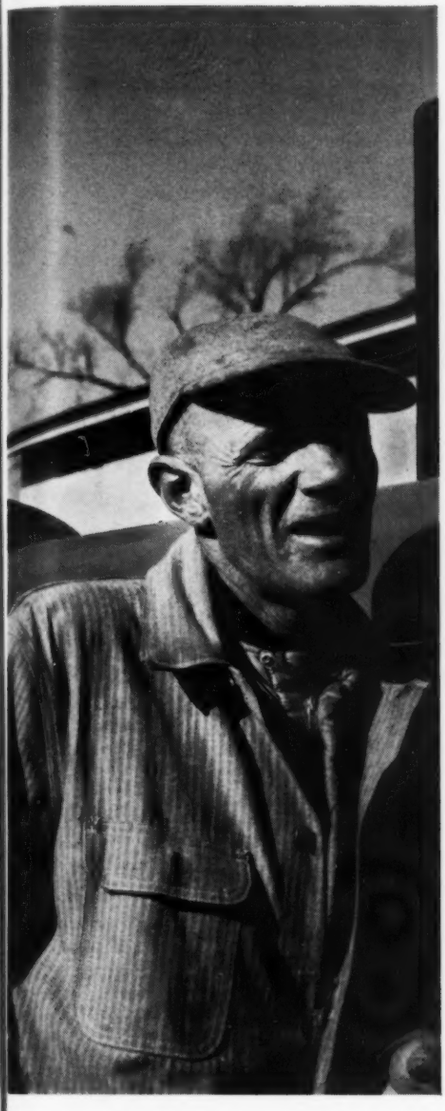
"We needed more plowing capacity and purchased a John Deere "3010" Diesel for its lugging power and economy. We're plowing in stubble, pulling in a higher gear than we used to. In stubble, it's 5th gear; in alfalfa, we pull in 3rd. We haven't found a place we can't plow in third gear.

"The Load-and-Depth Control is smooth; the plow stays right there . . . whether on the level or going over dikes, it makes no difference. The new John Deere is a well-balanced unit; there's enough weight to hold its power. It's everything we wanted."

RALPH BEAN, *Monteview, Idaho*

JOHN DEERE design, dependability and dealers MAKE

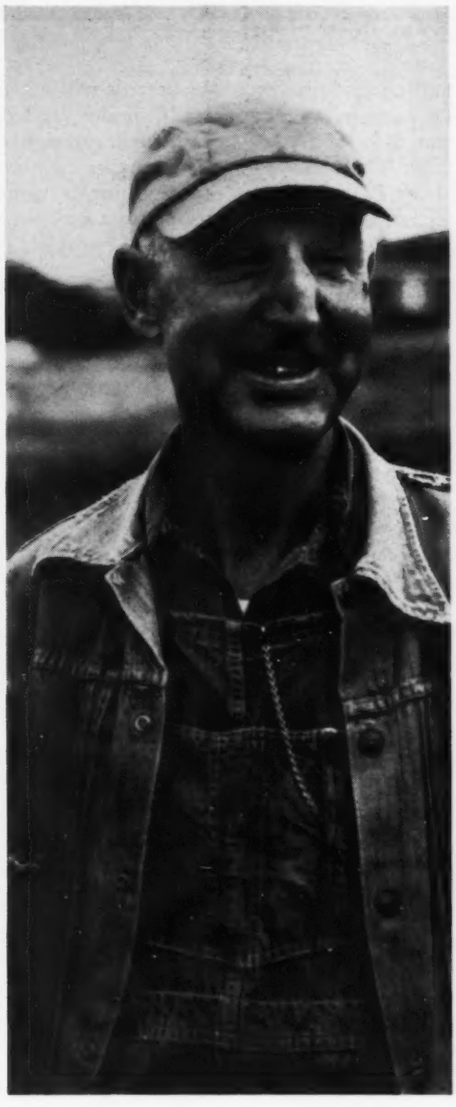
New Generation Tractors



"This New Variable-Speed Engine Makes Sense and Cents"

"My John Deere dealer brought out a "3010" Diesel and demonstrated it on a plow. After watching it and trying it out, I just couldn't let him take it back to town. I kept it. This new transmission is really great. I never had a tractor that shifted so nice and easy. The idea of this new variable-speed engine really appeals to me—makes lots of sense and cents. I've done some plowing with this tractor and it appears that I'm going to cut my fuel bill in half. I expect to save at least $500 a year on fuel."

HOLMES YOUNKER, *Pleasantville, Iowa*



"Riding and Handling Qualities of "2010" Can't Be Beat"

"I've always liked John Deere Tractors and the "2010" was just the kind of tractor I wanted. Its riding and handling qualities can't be beat. The transmission is also very good; you can shift from low to reverse without any trouble. We used the "2010" to harvest this year's corn crop and it sure made the job a lot easier, and with power steering, you just can't feel the pull on the wheel."

GLENN SIGMON, *Iron Station, North Carolina*

"These New "4010's" Save Me a Man on Each Job"

"These new "4010" Tractors save me a man on each job because they do more work. We haven't had a chance to try them on light loads yet; it's all been heavy plowing. We plow at 5½ mph, 12 inches deep, and that's a good load with a 4-bottom plow. We used about 25 gallons of fuel for each 8- to 9-hour day of very heavy plowing.

JOHN A. DONOVAN, *Mt. Morris, New York*

THE DIFFERENCE

JOHN DEERE

Your John Deere dealer invites you to drive a New Generation Tractor in the size, model, and fuel type that fits your operation. His convenient Credit Plan will help start this tractor earning for you.

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For more information, indicate size and type tractor below:
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☐ 80 h.p. "4010"
☐ Row-Crop ☐ Row-Crop Utility ☐ Utility ☐ Standard
☐ Hi-Crop

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Rural Route _____ Box _____
Town _____ State _____

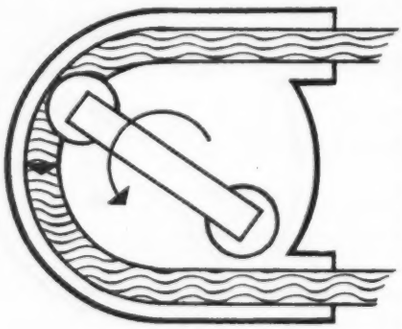
To Begin With

Cattle-Beef-People The figures for the cattle population of the United States were released about the end of February, and the actual count showed that estimates of cattle numbers were some six million high. This makes quite a difference to the cattle cycle estimates of the FQ article "Cattle-Beef-People" of Winter 1960. That estimated the cattle population at 104½ million. The true population is some 97.1 million, said the USDA estimate for January 1, 1961.

The graph used in the article used two percentages. Both are affected by the new lower cattle population estimates. The ratio of cattle to people is now 53.5 percent, against 57.8 percent with the old erroneous high estimate. The 20-year average is 56 percent, so it looks better for the cattleman this year than the old figure suggested.

Interest Again A book review, by rights, should appear in another column, but this appears here on the grounds the book in question is a book of interest. Interest and Mortgage Tables, in fact. Published this year by Ottenheimer Publishers, 4805 Nelson Ave., Baltimore 15, Md., it contains interest tables from one-eighth percent to eight percent. It costs 90 cents, and could save all of that in figuring the actual interest you are paying on a loan, or what the payments on a given loan will be.

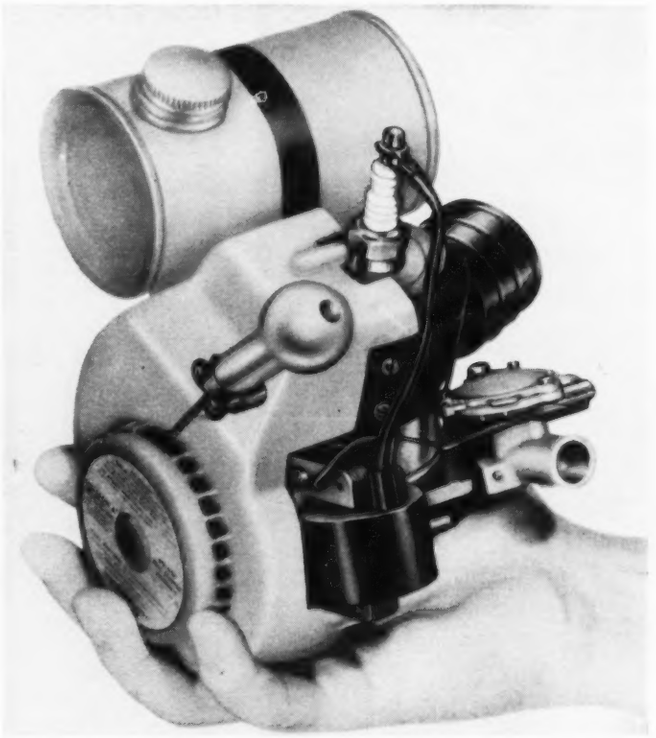
For Sale, New . . . Latest addition to the silage unloader field is a model for tower silos made by Acorn Equipment Co., Stevens Point, Wisconsin. The unloader is the type that sits on the silage, with no supporting cable. All parts pass through the silo doors, and the largest part (excluding the motor) weighs 82 pounds. The price for the 16-foot model is about $1,300, including five-horsepower motor and sixty feet of wire. Models from 10 to 20 feet are available. The unloader is the chain digger type, with a single chain digging and throwing the silage. The chain speed is about 40 feet per second (27 mph). The chain is driven by a three-horsepower electric motor on models up to fourteen feet, five horsepower in larger silos. On all sizes, forward motion comes from a half-horsepower motor connected to the driving wheels. A three-step pulley gives three forward speeds and one reverse—by twisting the V-belt.



Another interesting newcomer is the squeeze pump. This pump, now manufactured by the Randolph Co., Houston, Texas, works much as you hand-milk a cow. Two rollers run around a half-circle of plastic Neoprene tubing, forcing liquid inside the tubing forward ahead of the squeeze. The squeeze shuts the tube completely to prevent leakage, and the tube rapidly recovers its shape after the roller has passed. You pull the tube a few inches through the pump after each eight hours of use to prevent wear in one spot. The fluid pumped never comes into contact with the pump, which means you can pump anything the tubing will handle—gasoline, oil, chemicals which might affect metals, molasses, etc. There are two models, with capacities of 54 and 185 gallons per hour. Both are self-priming.

Being compact seems to be the thing nowadays, from waistlines to automobiles. Ohlsson and Rice, 3340 Emery St., Los Angeles 23, California, have a compact gasoline engine which looks good for several farm uses. It is a three-quarter-horsepower engine, which will fit inside a six-inch cube, and run in any position. It weighs 3¼ pounds without the gas tank, and runs at a governed 6,300 rpm. Cylinder displacement is around 1¼ cubic inches and the engines will run eight hours at full load on one gallon of gas.

The maker mentions possible applications—light cultivators, edgers, trimmers, pruning equipment, sprayers are a few. But how about fitting one to each rear wheel of a gocart? That should be quite a 4-H project. The engine retails for $42 00.



Not quite matchbox size, but very compact, the new ¾ hp engine.

Desalting Process An Israeli scientist, Dr. Alexander Zarchin, invented a process for desalting sea water which is now undergoing tests in the United States, and will be built into a pilot plant in Israel this year. It should be operating by late 1961 or early 1962. The Fairbanks Whitney Corporation, which is making the equipment in the United States, feels that it is the most economical method of desalting known today, and estimates a cost of 40 cents per 1,000 gallons of water desalted. This may be low enough to interest cities, though it is still high for irrigation water.

The process depends on the principle of freezing part of a solution of minerals in water—like sea water. The ice contains very low mineral content, and the remaining water, containing almost all the minerals, can be run off. The ice is then thawed, yielding relatively pure water.

The process is still kept secret, but one can guess there must be some recirculation device, so that the thawing ice cools incoming water. The source of power is secret, too, but present-day refrigerator equipment can run from power supplied by an electric or gasoline motor, and also using heat alone, as in the gas refrigerator.

Edible Hardware The University of Pennsylvania has tried tying bales with a rayon-cellophane twine that can be eaten. Sheep in tests had no trouble digesting the twine. If it can be made at a competitive price, the twine will put an end to bale-breaking before feeding. Now if someone will only come up with a digestible nail—bye-bye hardware disease.

Armco Drainage & Metal Products, Inc.,
5841 Curtis Street, Middletown, Ohio

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Steel — For strength, economy, durability

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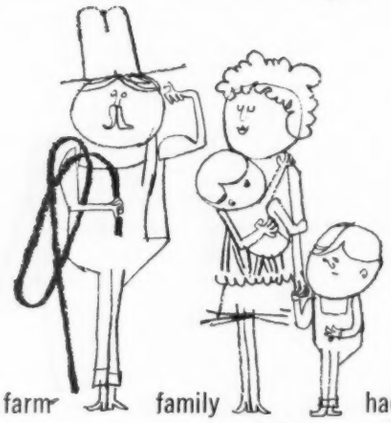
Flexible plastic pipe puts water on tap



A Pennsylvania farm family had a tricky problem getting drinking water to their house. Their well was 753 feet away, separated from the house by a lawn full of delicate-rooted shade trees. To get around the trees, they dug a winding ditch, 2-ft. deep, snaked flexible pipe made from DYLAN® polyethylene around curves and corners, under and through the roots without disturbing them! This would have been impossible with conventional metal pipe. ■ Pipe made from DYLAN polyethylene is ideal for distributing water on the farm. Its flexibility makes it easy to handle and fast to install. And because it's flexible, polyethylene pipe doesn't need joints or elbows . . . it bends. All you need for the installation is a knife to cut it and a screwdriver to tighten the simple fittings. Durable polyethylene pipe won't rust, corrode, rot, chip, crack, or rupture on freezing. It's practically maintenance-free. ■ Installed DYLAN polyethylene pipe costs less than metal pipe. It is lightweight; 300 feet of one-inch pipe weighs only 54 pounds. Look for the National Sanitation Foundation label, NSF on pipe made from DYLAN®. This means it is completely safe and approved for transporting drinking water. ■ For more information on polyethylene pipe, write for Koppers' two booklets: "How to Select and Install Polyethylene Pipe" and "Polyethylene Pipe—Yours for Better Living." Koppers Company, Inc., Plastics Division, Dept. 131, Pittsburgh 19, Pennsylvania.

KOPPERS PLASTICS KOPPERS

LETTERS

Nilgai Meat

Sirs:

Your article "Beef is on the Muscle" interested me very much. I dislike gobs of fat on meat and it is a waste.

I have been in India for over two years working for the U.S. Government as a secretary. During my tour here I have done a lot of hunting. There is one animal here that I have wished, since the first few I've shot, that I could take back to the States and raise for meat. It is the nilgai, a large antelope. The cow weighs up to 700 or 800 pounds and the buck will weigh from 1000 to 1400.

This animal has no wild taste, is quite stocky built for a wild animal and, best of all, I've yet to find blobs of fat in the carcass. I have shot several and helped skin and cut them up for freezing. This animal is not as wild as the deer; in fact I have walked up to within 50 yards of them in an open field before shooting. It seems to me it could be domesticated, and up-bred into a very good meat producer.

I myself will never be able to do anything about an idea such as this but I wonder if someone with the money for experimenting would be interested.

Vera M. Elam

New Delhi, India
(APO 143, Box ND
San Francisco, California)

Best Labor Piece

Sirs:

Congratulations to you on your Farm Labor piece. It is very good. We think it's the best yet.

Fred Podesta

P.O. Box 656
Linden, California

No Wheel Spinning

Sirs:

I was particularly well pleased with the report you made on "traction." This report indicates that you are certainly willing to discuss difficult subjects. You demonstrated your ability to discuss the various techniques used to improve traction in a way that should be very interesting to any reader. You did an excellent job of handling a very difficult topic.

I was equally interested in your article entitled "Planning Your Farm of the Future." I would add to that the story by Hugh Henderson entitled "Butt Silage." I could go right down the line and name practically all of the articles in this issue. You folks did an outstanding job and I thank you very much for the high-quality information that you are providing American farmers.

L. W. Hurlbut

Chairman
Dept. of Agricultural Engineering
The University of Nebraska
Lincoln, Nebraska

Save the Sow and Cure the Virus

Sirs:

I found your article "Kill the Sow and Cure the Virus" most interesting, though it seemed to me just a little impractical. I happened to pick up the February issue of the *Journal of Animal Science* recently and there I found an article on the "Eradication of Atrophic Rhinitis and Virus Pig Pneumonia from a Swine Herd." This told about experimental work done at Cornell University and it apparently did not involve killing the sow.

The pigs were removed from their dams immediately after birth and were raised in isolation. The summary of the article says: "Foundation animals were selected from pigs raised in this way and were mated by natural service to boars raised with them in isolation or by artificial insemination to regular herd sires. Pigs farrowed from these matings were raised in the conventional way, the only precaution being that of maintaining strict isolation from atrophic rhinitis-virus pneumonia-infected swine.

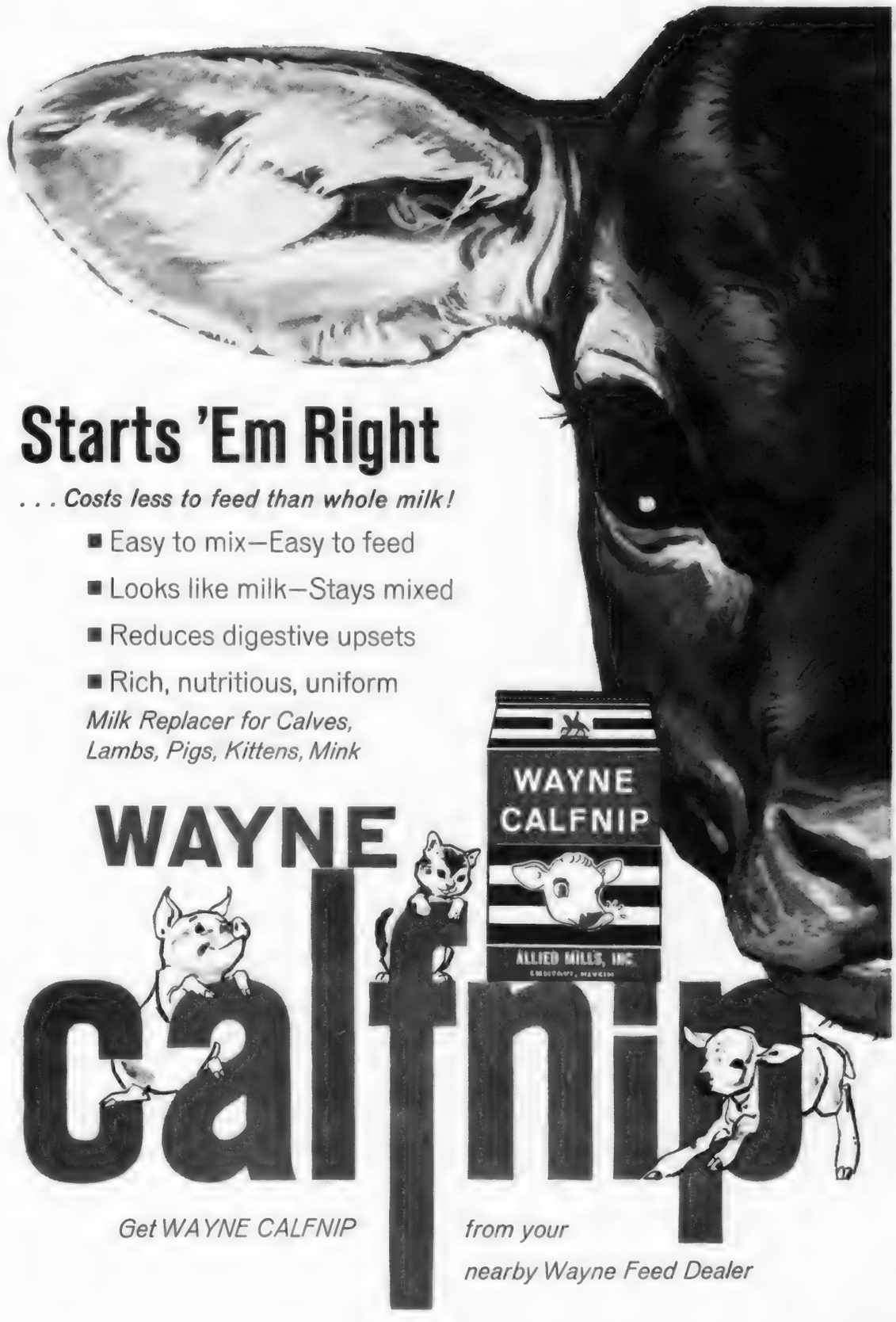
"Of 91 snouts and lungs checked from the main herd over a two-year period, 8 and 31 have been diagnosed positive for atrophic rhinitis and virus pneumonia, respectively, as compared to 0 and 0 out of 39 checked from the group raised in isolation.

"These preliminary data lend further support to the evidence that these two diseases are spread only by direct contact of infected swine with susceptible swine. This provides a means of simultaneously eradicating atrophic rhinitis and virus pig pneumonia from a swine herd under reasonably practical conditions."

Doesn't this seem like a more practical and economical method of getting SPF pigs than the hysterectomy?

Milton L. Simms

Bloomington, Indiana



Starts 'Em Right

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- Easy to mix—Easy to feed
- Looks like milk—Stays mixed
- Reduces digestive upsets
- Rich, nutritious, uniform

Milk Replacer for Calves, Lambs, Pigs, Kittens, Mink

WAYNE calfnip

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Only the new Internationals offer you job-designed front suspension

With these new light-duty models, your job can decide. INTERNATIONAL'S independent torsion-bar front suspension gives you a velvety ride, even on a thumping washboard of a road.

INTERNATIONAL'S I-beam front axle with leaf springs has the extra muscle to haul heavier loads and still smooth out your ride.

Only from INTERNATIONAL can you get the front suspension exactly suited to your job.

Other things you'll like: easier steering and shifting; new low-swept hoods for a wider, safer view; 5-inch longer wheelbase for greater stability; a powerful V-8 that's thrifty, the envy of the whole truck world; your choice of rear-wheel or all-wheel-drive.

See your INTERNATIONAL Dealer or Branch for a test-drive.

INTERNATIONAL® TRUCKS

WORLD'S MOST COMPLETE LINE

International Harvester Company, Chicago • Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

FIRESTONE FLEX-FORTIFIED SIDEWALLS

built to end costly cracks and breaks

Ordinary tractor tires give you the same rubber in the sidewalls as in the tread. Firestone gives you a rubber specially compounded to survive the constant flexing sidewalls must take. Firestone puts more spring into sidewall rubber, gives it the extra comeback and toughness to resist cracking, breaking, weakening and aging. Firestone sidewalls are Flex-Fortified for extra strength and service . . . as proved in normal use and on-the-farm tests! And look what *else* Firestone (and *only* Firestone) gives you: new longer-wearing Firestone Rubber-XF tread rubber; tough Shock-Fortified cord—and the superior pulling action of Firestone Powerized traction bars. One more thing: Firestone loans you *brand-new* tractor tires to use when yours go in for retreading or repairs. Buy farm-proved Firestones now—at your Firestone Dealer, Store or service station. *Always a year to pay!*

Tune in Eyewitness to History every Friday evening, CBS Television Network

Firestone

FIRST IN FARM TIRE NEEDS

Copyright 1961, The Firestone Tire & Rubber Company

M. H. Lee, manager of Tappen Dairy Farms, Brandon, S. D., *says: "Firestones last longer and are a lot less trouble than other tires. It's strictly Firestones for me. Get wonderful service, too, from Bob Davis Firestone in Sioux Falls."*

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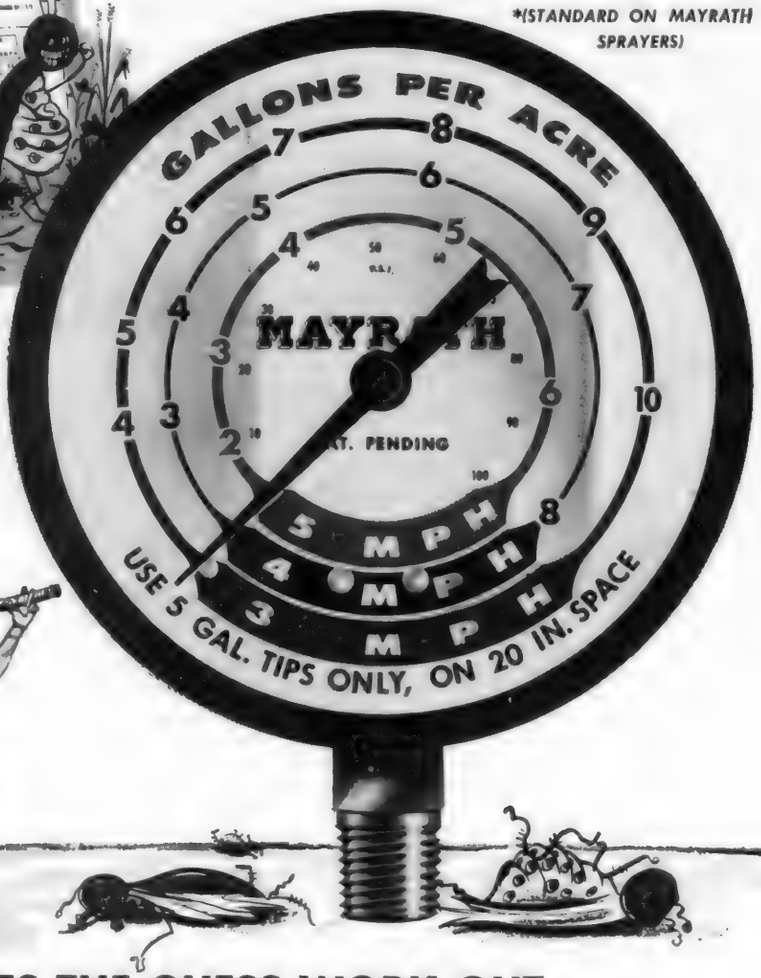
MAYRATH

GALLONS PER ACRE *GAUGE**

*(STANDARD ON MAYRATH SPRAYERS)

HAPPY BUGS and WEEDS



HAPPY FARMER

TAKES THE GUESS WORK OUT
TELLS YOU HOW MUCH YOU USE PER ACRE
SAFE, SURE, CERTAIN SPRAYING

TRACTOR MOUNTED $139
TRAILER MOUNTED . . . . . add $30

PRICES F.O.B. DODGE CITY, KANSAS; COMPTON, ILLINOIS; OR MONMOUTH, ILLINOIS

NEW

handles any silage ...even long-cut grass!

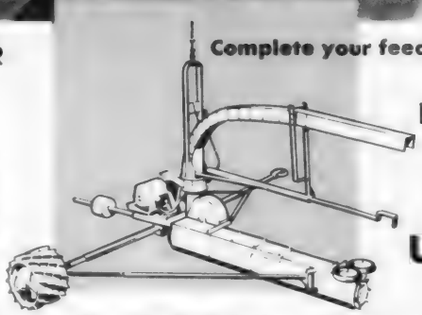
Badger SLOTTED TUBE FEEDER

mixes any ground feed with any type silage as it distributes

You are not "tied" to any ration with this amazing feeder — with its revolutionary new slotted design. Put through corn, silage, long-cut grass silage, grain or supplement — singly or in any combination — and the result is the same: individual servings before each animal the entire length of the bunk. It's the slot that makes the difference, and only Badger has it. And, of course, you can feed different rations on both sides and at both ends of the bunk. The 9-inch galvanized tube has adequate capacity for most farmers — but for the man who wants VOLUME, there's an 11-inch Jumbo tube that will easily handle the output from two big silo unloaders simultaneously! This is the most efficient, versatile, automatic feeder you can install — and your Badger dealer is specially equipped to help you capitalize on the advantages it holds for you in your feedlot. See him today — or write for information.

Complete your feedlot Cost-Cutting Team with a

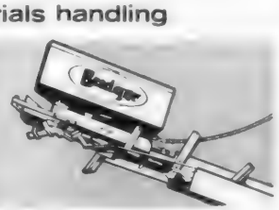
BIG CAPACITY BADGER SILO UNLOADER



Complete reliability — proven on thousands of farms in all types of silage (even frozen grass)—assures a payoff in time and labor savings when you invest in a Badger. This high-quality, big-capacity machine digs out and fluffs up silage from virtually any silo built. Push-button feeding at its best!

Specialists in farm materials handling

AUTOMATIC FEEDERS — A full line of auger, tube and Round-the-Silo feeders for every size feeding operation and pocketbook.



BARN CLEANERS — 3 rugged, all spur-gear transmissions, 2 forged-link chains — a size for every barn. Unsurpassed in quality, dependability.

Badger

New Booklet Tells How You Can Make Low Moisture Grass Silage In Any Silo

Your regular upright silo and harvesting equipment are all you need to make high-quality LOW-MOISTURE GRASS SILAGE—and produce more meat or milk per acre of forage. Send for booklet now, and increase this year's profits.

BADGER NORTHLAND INC.
Dept. Q — Kaukauna, Wisconsin

FREE how-to-do-it booklets . . . 28 pages of ideas on Feedlot Layout, Low-Moisture Grass Silage.

Please send literature on the following:

- ☐ Silo Unloaders
- ☐ Auger Feeders
- ☐ Barn Cleaners
- ☐ Feedlot Layout
- ☐ Slotted Tube Feeders
- ☐ Grass Silage

Name ..... Student ☐

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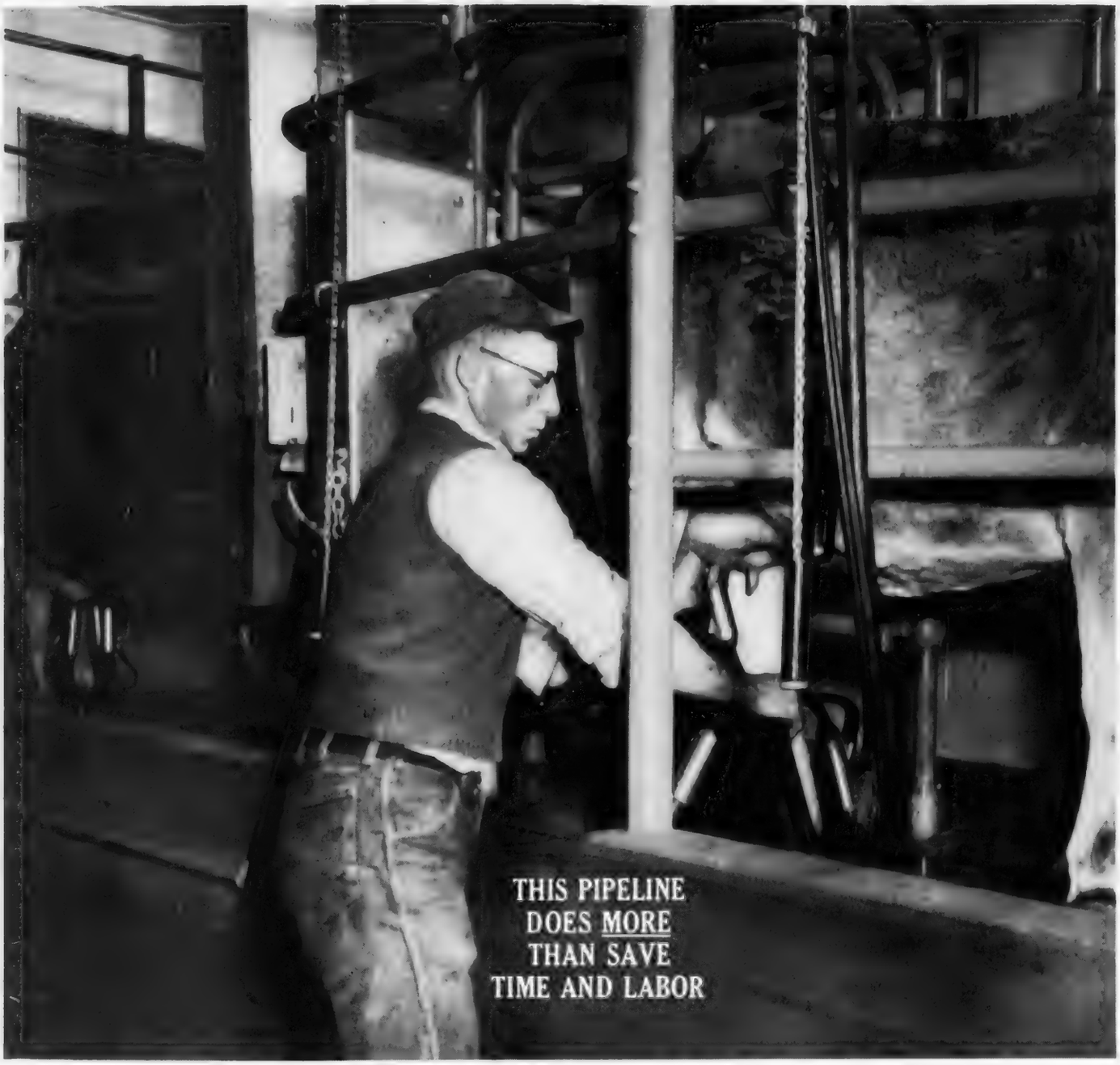
Dealerships available in some areas. Write for details.

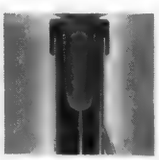
More Farmers Buy Badger Silo Unloaders Than Any Other



YOU GET BETTER MILKING

with a De Laval Combine Milker—and it's priced no higher than other pipelines!

Why only De Laval milks fast, clean and gentle



De Laval uses narrow-bore liners that fit snug, get milk out with a gentle massaging action.

Our magnetic pulsation gives you absolutely uniform milking. No variation no matter who milks.

De Laval's rotary vacuum pump cuts vacuum drop-offs that cause slow, erratic milking.

A De Laval double 2 side-opening parlor installation costs only $1.40 per milking . . .

All pipeline milkers save time and labor, but only De Laval gives you fast, clean, gentle milking.

You need fast, clean milking for top production. When cows "let down" milk you must get it fast . . . before udder muscles tire and stop the flow. The milk you *don't* get is lost forever—and when you lose milk twice a day you lose money!

You need gentle milking to keep cows healthy. Rough milking can make teats hard and sore . . . cause congestion in teat canals and lead to udder troubles. But De Laval milking is remarkably gentle on sensitive teats and udder tissues. This keeps production and herd health up, mastitis down!

Only De Laval milks this better way because only De Laval has *narrow-bore liners, absolutely uniform pulsation and rapid-recovery vacuum.*

A double 2 side-opening parlor installation costs only $1.40 per milking after 10% down. Take 48 months to pay. Price includes installation, stalls and all equipment for milking and "Turbulent Action" Automatic Washing. With this system one man can milk 35 cows an hour. See your De Laval Dealer for your parlor or around-the-barn system. The De Laval Separator Co., Poughkeepsie, N. Y.; 5724 N. Pulaski, Chicago 46, Ill.; 201 E. Millbrae Ave., Millbrae, Cal.

. . . 10% down, up to 4 years to pay.

DE LAVAL

DE LAVAL COMBINE MILKER®

Only NEW IDEA has *free-flow* design that's almost impossible to plug!

NEW IDEA Hay Conditioners' Free-Flow Design has a more aggressive, plug-free feed-through than any other conditioner. It's not just a crimper or a crusher, but a combination of the best of both methods. It combines a big, self-cleaning rubber crushing roll . . . and a steel pick-up roll with staggered flutes that are tapered at the end.

The result: you get faster, more even curing and leafier hay in at least one less day. Yet the tender touch of *this* conditioner means less damage to the leaves, less leaf loss.

Balanced for easy one-man hook-up, NEW IDEA Hay Conditioner can be hitched behind a NEW IDEA semi-mounted mower for once-over mowing and conditioning. Rock-proof roll design kicks large rocks out of the way, and allows small rocks to feed through without damaging rolls.

See your NEW IDEA dealer today for the hay conditioner that's next to impossible to plug. Or mail the coupon for free literature on NEW IDEA Hay Conditioners, and the free Hay Conditioning Profit Calculator.

MAIL THIS COUPON TODAY

NEW IDEA, Dept. 180
Coldwater, Ohio

Please Send Me:

☐ Hay Conditioner Literature

☐ Hay Conditioner Profit Calculator

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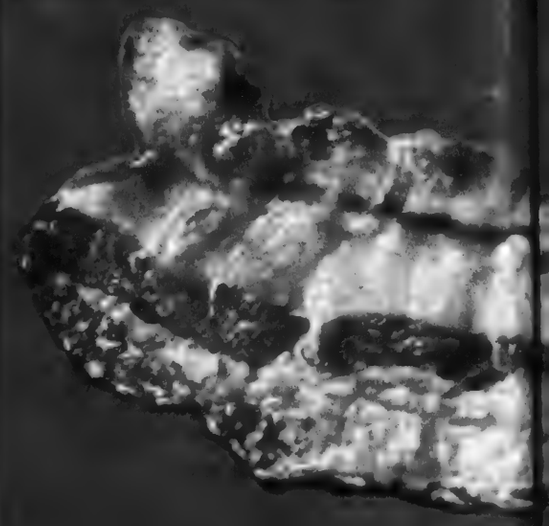
PRODUCT OF Avco CORPORATION

NEW IDEA

When you *really* want results ask for potent Terramycin

BRAND OF OXYTETRACYCLINE



More meat with Terramycin

Small amounts of Terramycin in swine feeds help produce more gain per day and send animals to market faster.

A survey of *all* the Terramycin growth trials reported in scientific journals over a seven-year period shows:

- Terramycin in the feed increased growth in more than 7 out of every 8 trials.
- The increases ranged from 1% to 22% . . . averaged over 7%.
- To break even* on Terramycin costs, all you need is a 1.2% increase in gains.

Less feed per pound of gain

The same studies also showed:

- Terramycin reduced the amount of feed needed to produce a pound of gain 7 out of every 10 times.
- The improvements ranged from .3 to 11.1% . . . averaged 4.1%.
- To break even* on using Terramycin in the feed, all that is needed is a 1.3% increase in feed efficiency.

Greater disease control, too

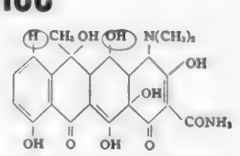
Terramycin in one or more of its product forms is an aid in the prevention, treatment or reduction of losses associated with:

- atrophic rhinitis
- intestinal infections:
  - scours (also known as infectious enteritis · vibrio dysentery · necro · necrotic enteritis · salmonella infections · black scours · bloody dysentery · bacterial diarrhea · bacillary infections associated with virus diseases · bacterial complications associated with infectious dysentery)
- leptospirosis
- setbacks at times of stress**
- respiratory diseases
  - pneumonia
  - bronchitis
  - pleurisy
  - bacterial infections associated with virus diseases
- swine erysipelas
- mastitis
- navel ill
- nephritis
- metritis
- wound infections
- secondary infections**
- liver abscesses

***due to Terramycin-susceptible organisms*

When disease hits or threatens, call your veterinarian. He knows best.

The potency-protected molecule makes the difference



There is a difference in antibiotics. And Terramycin's got it. It's the only broad spectrum farm antibiotic with the unique hydrogen-hydroxyl pair (circled at right) that helps protect stability . . . helps you make sure you get the potent antibiotic you paid for.

Ask for potent Terramycin—in your feeds, drinking-water treatments, tablets, injections or mastitis treatments. Rely on your veterinarian for accurate diagnosis and treatment of disease.

**Based on total feed costs of $64 per ton, a feed efficiency of 3.7, a market price for swine of $13.50 per cwt., and 10 gm. Terramycin per ton.*

Chas. Pfizer & Co., Inc., Brooklyn 6, N. Y.

Science for the world's well-being®

Pfizer

THEY WORK HARDER SO YOU CAN TAKE IT EASIER!

THRIFTY CORVAIR 95's Just wheel out the produce . . . let livestock walk the plank themselves. This work-saving, time-saving Rampside model is the best news for farmers since the automatic milker! While you're taking it easy, Corvair 95's are working hard, earning more and requiring less maintenance to boot! They'll carry up to 1,900 pounds on a 95-inch wheelbase and are as much at home trailblazing over rough and rugged backroads as they are sailing along on the highway. You can thank 4-wheel independent suspension for that. The one-piece body frame is made to order for off-the-road punishment. Plenty of see-space through the wide windshield. A roomy, comfortable cab. A thrifty air-cooled rear engine that never uses water or antifreeze. Any way you look at them, these Corvair 95's spell economy and long life.

WORK-PROVED CHEVROLETS This one's a real champ when it comes to farm chores. For all kinds of jobs, hauling perishables, livestock, makes no difference what, Chevrolet's I.F.S. makes every ride easier—*for* the driver and *on* the load. Easier on the truck, too. Cuts down tire abuse and needless wear and tear on the sheet metal. Put a Chevy truck to work on your farm (pickup, stake, whatever you need) and see for yourself. . . . Chevrolet Division of General Motors, Detroit 2, Mich.

CHEVY I.F.S. TRUCKS

I.F.S. — FRONT INDEPENDENT SUSPENSION

Farm Books

***The Shetland Pony,** by L. Frank Bedell, The Iowa State University Press, Ames, $4.95.*

Most books on ponies seem to be either sentimental things written for horse-crazy kids or unorganized collections designed to help their elders maintain their pride in old Harrigo's Fancy Bottom who has missed the money five times in a row, thanks to "incompetent" judges at local fairs.

Frank Bedell's book happily has escaped both these traps. It is a good book on breeding, raising, training, selling and showing Shetland Ponies. The chapter on breeding is particularly good and shows the influence of Iowa's geneticist Prof. J. L. Lush, one of a number of authorities to whom the author expresses appreciation in his foreword. Bedell is not afraid of frank talk. "In the last few years," he says, "all one had to do to receive from 50 percent to 100 percent profit on Shetlands, was to buy them, keep them 6 months or a year, and then sell them. Thus, dealing was emphasized instead of breeding."

If ponies are your dish this is your book.

—C.R.K.

***The Balance of Nature,** by Lorus J. and Margery Milne, Alfred A. Knopf, New York, $5.00.*

The Milnes' theme is that once one item, no matter how insignificant it may seem, is lifted off the delicate balance of nature a whole chain of far-reaching and often unforseeable reactions is bound to follow. This book is a fascinating collection of scores of such instances.

Take the crocodile, for example. The Milnes point out that in British East Africa fishermen are distraught because fish in their nets are being destroyed by otters which have become numerous and intrepid since their chief enemy, the crocodile became rare. And in Madagascar, after the crocodiles were virtually eliminated, the number of stray dogs and wild pigs rose spectacularly. Farmers now demand governmental protection for their crops which are threatened by the pigs. And with the increase in stray dogs has come one outbreak of rabies after another.

On the other hand the Milnes show how a policy of "be kind to deer" has been one of the most unkindest cuts of all to the *Cervidae* of a certain area of Arizona.

This is a thoroughly provocative work by a couple of naturalists who are extremely skillful in making their points. Their chapter, "The Greatest Threat to Life on Earth" has nothing to do with The Bomb. It is a damaging indictment of the indiscriminate use of chemical pesticides.—C.R.K.

This One Unit...

FEEDS UP TO 75 HOGS . . . PAYS FOR ITSELF IN ONE YEAR!

Pays for itself three ways — in the *labor* it saves, in the *quicker, cheaper finish* it puts on your hogs, and in the *feed* that doesn't go to waste.

Smidley is the only truly "waste-proof" feeder. That's because Smidley's patented agitator control automatically shuts off the flow of feed when there is feed in the trough.

State, Federal and Commercial Swine Farms check feed waste to the ounce. They use Smidley Feeders in their experimental work because they have to know the feed supplied goes into the hog and not on the ground.

What other farm tool will work for you day and night for 15 years and pay for itself in the feed saved every year?

Write Sam Marting for descriptive folders and prices, or for help in solving any hog lot problem.

SMIDLEY

Hog Feeders
Cattle Feeders
Pig, Lamb, Calf Creeps
Automatic Waterers

MARTING MFG. INC.

Washington Court House, Ohio, Phone 23971 • Britt, Iowa, Phone 2031

DEALERSHIPS AVAILABLE

YOU MEAN LIVE TENDER GREEN GRASS FOR MY COWS THE YEAR AROUND?

Yes, and economically, too, with a Buckeye grass incubator!

GRASS INCUBATOR DIVISION

THE BUCKEYE INCUBATOR CO. • Springfield, Ohio, U.S.A.

PLEASE SEND INFORMATION on GROWING GRASS in an INCUBATOR and HOW OTHERS ARE PROFITING

Name_____

Address_____

City_____ Zone____ State_____

Super Hayliner 69—New Holland's 14 x 18 baler, with automatic wagon-loading feature, Flow-Action feed, Tractor-Seat Controls; without "extras" is Super Hayliner 67. For larger farms, the 16 x 18 Super Hayliner 78 or self-propelled Haycruiser; for smaller farms, the new 12 x 16 Compact Hayliner 65 with Tele-Flow feed.

Now bale twice as fast with half the labor!

Today there's a new way to bale—that lets one man bale and load faster than a 2- or 3-man team! Fully proved on hundreds of farms. Choice of five models. New Compact model with automatic wagon-loading feature costs no more than many balers alone!

Here's the biggest farming news of '61—*proved, practical one-man haying!* No longer need bales be stacked in the wagon by slow, costly human labor. Now one man can bale *and load* automatically—in half the time it takes with manual loading!

How it works

The new system consists of a New Holland Hayliner—the baler that outsells every other—plus a simple, sure-fire mechanism that "airlifts" the bales into the trailing wagon. You position the bales right from the tractor seat. Doesn't miss—even on turns.

One-man baling and loading has been fully proved on hundreds of farms, with millions of bales. It's ready for you *now*.

What it costs

Because of its basically simple principle, this New Holland baling method costs surprisingly little. In fact, the new Compact Hayliner 65 costs no more with Bale-Thrower than many balers *without* this feature.

Any Hayliner model you select can soon pay for itself:

- **You will save your own time,** because you will bale steadily at much faster speed.
- **You will save labor costs.** Instead of loading wagons, your helpers can be doing other, more profitable work.

At your dealer's now

If you already own a twine-tie New Holland Hayliner, you can easily convert to one-man haying. If your present baler is another make, your New Holland dealer will offer you a generous trade-in, and terms that let you pay as you save. See him right away for a demonstration; plan to enjoy the savings of one-man haying *this* year! New Holland Machine Co. Division of Sperry Rand Corp., New Holland, Pa.

BALER BOY TWINE gives you imported twine economy plus New Holland's rigid quality control. For extra strength, ask for New Holland's Super 9 or Long 10 twines.

NH NEW HOLLAND

"First in Grassland Farming"

Tilt-up Concrete

FQ REPORT

PROBLEM: A low-cost method of constructing concrete farm buildings is needed.

BACKGROUND: Brick, wood, block, or poured-in-place cement walls represent 50% of the cost of conventional buildings. Poured concrete walls tilted into place cut this cost. The floor is placed first. Walls are cast in flat panels on the floor with a plastic sheet between each panel and the floor. Window and door frames and insulation material can be cast into the panels. Panels are tilted upright by tractor-power so their ends rest on piers set around the edge of the floor. Space between wall sections (6 in.) is filled by concrete columns set on top of the piers which support the panels between them. Columns are flush with the inside of the wall and extend 3⅜ in. on the outside. Corners, too, are joined by columns.

MATERIALS: Quantities are listed for each pier, panel, or column, based on 10 by 10 ft. panels, 4 in. thick. Total quantity needed depends on number of panels used. Savings on construction lumber are possible by building half the panels on separate days. One cubic yard of concrete requires 6¼ sacks cement, ½ cu. yd. sand and ¾ cu. yd. gravel (1 in. maximum size).

Piers. A pier is needed on each side of a panel. Piers are 16 by 24 in. and at least 3 ft. deep. Corner piers overlap forming a single L-shaped pier with legs 24 in. long and 16 in. wide. Required are: (a) 0.32 cu. yds. minimum concrete for regular pier and 0.41 cu. yds. minimum for corner pier, (b) 3 No. 6 reinforcing bars 18 in. longer than depth of pier (minimum length 4 ft. 6 in. per bar), (c) a mold made from lumber or from a 20-in. tile.

Floor. Compute cubic yards of concrete needed for a floor 4 in. thick by dividing the floor area in square feet by 100 and multiplying the result by ¼. Tilt-up buildings can have earth floors.

Panels. One panel plus columns yields 10 ft. 6 in. of wall width. For each panel get: (a) 1.23 cu. yds. concrete, (b) 5 No. 3 bars 9 ft. 9 in. long for the vertical grid with 2 extra for each door and window, (c) 5 No. 3 bars 10 ft. 3 in. long with 2 extra for each door and window, (d) 42 ft. of 2 by 4's for casting form, (e) 2 braces about 15 ft. long to hold panels till columns are cast, (f) window and door frames if desired, plus lumber to hold them in the form, (g) about 144 sq. ft. of 4-mil polyethylene plastic, (h) four ¾ by 6-in. bolts for attaching tilting frame and two ½ by 8-in. bolts for attaching braces.

Columns. All columns require: (a) three No. 6 bars, 9 ft. 10 in. long, (b) two sheets of 4-mil polyethylene plastic about 10½ ft. by 1 ft., (c) 12 commercial form ties, and (d) 12 cleats to hold form ties. Columns not forming corners further need: (a) 0.16 cu. yds. concrete, (b) plywood—one sheet 10 ft. by 14 in., another 10 ft. by 10 in., and (c) two 2 by 4's, ten ft. long. Corner columns further need: (a) 0.29 cu. yds. concrete, (b) plywood—one sheet 10 ft. by 18 in., another 10 ft. by 16 in. and (c) five 2 by 4's, ten ft. long.

TECHNIQUES: The piers of a tilt-up building are usually set first for easy maneuvering while digging.

Piers. Dig piers with the centers 10½ ft. apart. Use a power auger, and square off the holes. Be sure piers extend below the frostline to firm soil. Except for corner piers, the three bars form a triangle with equal 4½-in. sides. The base of the triangle is nearest the outside and the point centers with the panels. On corner piers, bars are 2 in. from the outside edges and 9 in. apart, and the triangle points toward the corner.

Floor. The floor of the building provides the casting surface for the wall panels. It is possible to prepare a sand-casting bed for buildings without concrete floors. Sand-bed panels are harder to handle and are sometimes raised with cranes, not tractors.

Panels. Place sheets of polyethylene plastic on the area of the floor to be covered by the panel so panel won't stick to floor after casting.

Now in one mower line all the features farmers demand!

Cuts clean . . . cuts smooth . . . cuts fast!
Matches mowing to your haying speed!

No matter what type of mower you prefer, you get *more field-proved features* when it's a New Holland! For example, check the quality features of the New Holland "47" semi-mounted Mower:

- **Heavy-duty guards** stay in line. Firmly seated against extra-thick cutter bar.
- **Universal Hitch** fits most popular make tractors.
- **Ledger plates** are beveled; keep their sharp, saw-tooth edges.
- **Pitman sheave and flywheel** are cast in one piece to absorb shocks. Fewer bent shafts and sheared keys.
- **V-belt sheave** is quiet; quickly adjusted for proper tension. Gives slip clutch action without complicated adjustments.
- **Tilt adjustment** (crank type) gives you clean cutting action in a wide variety of crop conditions.
- **Double-hinged inner shoe** and shoe support, both front and back, give extra sturdiness and flexibility.
- **One-piece welded frame** has no bolts to work loose —always stays tight.

New Holland "47" Semi-Mounted Mower whisks through your crops with effortless speed. Hook up a New Holland "404" Crusher or "401" Crimper, and you can mow *and* condition in *one* fast trip!

There's a New Holland Mower to fit your needs: "47" semi-mounted, "45" fully mounted and "46" trail-type. See your New Holland dealer now; have him demonstrate the mower you need, right on your own farm! So easy to own, too, with his flexible finance plan!

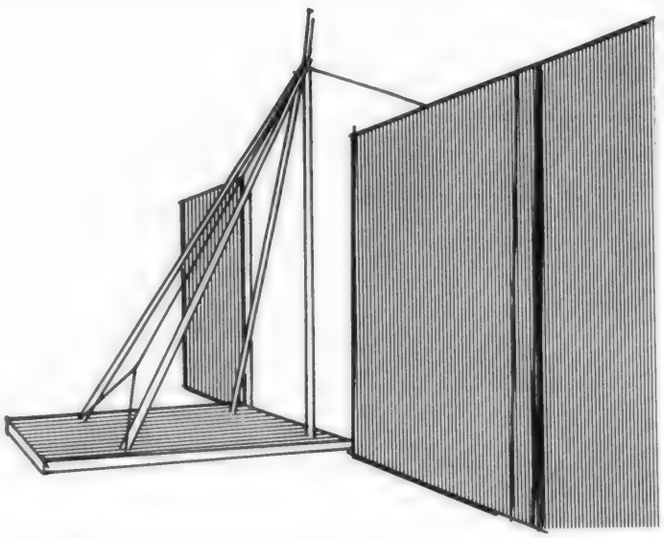
FREE BOOKLET! Write New Holland Machine Co. Division of Sperry Rand Corp., New Holland, Pa.

New Holland "46" Mower (Trail-Type), attaches to almost any tractor by dropping a pin into the drawbar.

NEW HOLLAND *"First in Grassland Farming"*

Set the wood forms so the edge of the panel will be 7⅝ in. from the outside face of the piers. Use the inner reinforcing bar of the piers to align and anchor the form. For further stability also stake and block the form. Allow 6 in. clear space between panels for wall columns. Since panels are tilted outward, both corner panels can't be placed in tilting position at the same time. Cast and tilt one of the panels after the other. Place 6 reinforcing bars in a 2½-ft. square grid: the other four bars go along the sides 3 in. from the edge. Horizontal bars are 3 in. longer than the panel and are held in place by slots made in the frame about 1 in. above the surface of the casting bed. Wire vertical bars across horizontal bars. Panels with doors and windows should have additional bars along each side of the opening. Also place short bars diagonally at the corners of openings. Brace frames for doors and windows inside the wood form for the panel and weight or stake them to keep them from floating. Wrap bolts to which tilting frame will be attached in polyethylene for easy removal after tilting. The two lower bolts fasten where the bars nearest the lower corners of the panel intersect. The top bolts go where the second horizontal bar from the top and the second vertical bars from the sides intersect. If door or window frames interfere with this placement of tilting bolts, be sure alternative placement of bolts is equidistant from the panel sides. Set two permanent bolts in the top edge of the panel for wall braces to hook on after tilting. (These bolts will later hold roof plates.) Fit them through slots cut into the casting form of the panel.

Casting. Order ready-mix with at least 6 sacks of cement per cubic yard. In home mixes, always use water sparingly. A stiff mix that won't run is one of the most important requirements for making durable concrete. Mixing formula is 1-2¼-3 (1 cu. ft. cement; 2¼ cu. ft. sand; 3 cu. ft. gravel). Place concrete as you would for any flat surface. It is possible to place polystyrene or vermiculite insulation in the concrete. Provide holes for attaching feedbunks, etc., after wall is finished, by driving wooden dowels wrapped in paper into the concrete prior to finishing. Any finish put on panels lying flat will show on the *outside* of the building after erection. Cure



The tilting frame is what makes tilt-up wall construction possible using power from farm equipment. It consists of four converging legs, usually constructed from pipe. The top legs may be made adjustable by fitting a 1½-in. pipe inside a 2-in. pipe. A single ½-in. hole in the 1½-in. pipe is aligned with a set screw in one of a number of ½-in. holes in the 2-in. pipe. The bottom legs are attached to the bolts in the panel by a hinge, so they can be connected while the frame lies on its side. Then the frame is lifted upright and the top legs are attached. The bolts holding the frame to the panel are wrapped in polyethylene plastic fastened with a rubber band, so that they are removable after the panel is tilted. The bolts are wired to intersections of reinforcing bars inside the panel. A chain is hooked between the top legs and the ½-in. cable, 55-ft. long, used to pull the frame is tied to the chain. From there it passes over the point where the legs of the frame meet, to the tractor. A steady, even pull is needed for tilting.

New Holland "404" Crusher maintains constant spring pressure to avoid overcrushing. Exclusive pickup height adjustment brings throat opening closer to ground. Hooks up to a New Holland "47" Mower, so you can mow *and* crush in one operation.

New Holland "401" Crimper crimps stems with smooth meshing action. Leaves a light, fluffy, fast-drying swath. Hooks up to a New Holland "47" Mower, so you can mow and crimp in one trip!

Pick your way to save a haying day!

Crimp it or crush it...
New Holland offers you a choice!

Which do you prefer . . . crimping or crushing? Either way, you can save up to 50% in curing time with these New Holland Hay Conditioners.

Humid area or dry—it makes no difference. Hay conditioning will help you cure your hay faster, more evenly. And you'll get better hay, too, richer in the proteins that mean bigger profits for you. That's because New Holland Hay Conditioners—"404" Crusher or "401" Crimper—save precious feed value, give you dependable performance when every moment counts!

See your New Holland dealer soon. Ask him to help you select and to demonstrate the conditioner that's right for your farm. Easy to own, too, thanks to his flexible finance plan!

FREE BOOKLET—write New Holland Machine Company Division of Sperry Rand Corporation, New Holland, Pa.

NH NEW HOLLAND *"First in Grassland Farming"*

panels at least 5 days before tilting. Polyethylene plastic makes a good cover. Plastic sprays for curing can be used after tilting.

Tilting. Strip wooden casting form from panels before attaching tilting frame. The tilting frame has four legs. The bottom legs (11½ ft. long) are 9½ ft. apart and meet 10 ft. above the panel. The plane of the triangle they form with the panel is at right angles to the panel. The top legs (attached to bolts in the panel 7 ft. above the bottom legs) meet the junction of the bottom legs, and all four legs are bolted together. One of the bottom legs extends four feet beyond the point where the legs meet, as a handle for the frame. Top legs often are telescoping sections of pipe that can be extended and then set with screws at varying positions. When lifting bolts are moved from their normal positions, telescoping legs are a must. For details on tilting see diagram on page 22.

To keep slab from tilting past upright position, place a wooden horse so it will catch frame handle when panel is upright. Place two braces that have strips of 28-gage metal nailed to them. The metal strips are bored to hook into bolts projecting from top edge of panel, to hold each panel till columns are placed. Both braces are on the outside. Don't disconnect tractor from cable till braces are firmly in place. Then remove the frame and the bolts that held it to the panel. Fill holes with mortar. Wall sections properly aligned when cast will line up after erection if the floor is fairly level. Floors with slope may cause slippage, but this can be corrected with prying bars. Panels weigh 1½ tons.

Columns. Hang polyethylene bond breaker along the end of each panel so panels won't stick to the columns. This gives columns space to expand after being placed. Wire reinforcing bars to the extensions on the reinforcing bars of the pier. Wrap the stubs of horizontal reinforcing bars protruding from the panels with polyethylene to further prevent bonding. To make the casting form, set 2 by 4's on edge 2 in. back from the ends of the panels. This will make the column protrude 3⅝ in. from the wall on the outside of the building, but flush with the wall panels on the inside. Complete the form with the narrower piece of plywood on the inside and the wider one over the edge of the 2 by 4's on the outside of the column. Space cleats on top of the plywood and tie them with commercial form ties or 10-gage aluminum wire. As you place concrete in the form, spade well to prevent honeycombing. Tap forms with a heavy hammer to help compaction.

Corner columns. Corner columns are larger than the others. The outside faces of corner columns will be 12 in. by 12 in. Again, set two 2 by 4's on edge 2 in. back from the edge of each panel. Two more lengths of lumber lie with their sides along the inside face of the panel protruding past the panels enough to form a corner. The fifth length of lumber holds the other edges of the two pieces of plywood, which form the outside faces of the column. (There is no plywood on the inside faces of corner columns. The inside corner is formed by the 2 by 4's, as stated above.) Keep wall braces in place at least two days till columns are firm enough to support wall panels. Column construction provides support for a clear-span roof, so any partitions built inside of the building can be made removable.

COST: Costs vary with the amount of work necessary after panels are in place. A 100 by 32 ft. open-front cattle shelter built in Ohio last summer cost $1.16 per sq. ft. It included aluminum roofing and aluminum siding between the panels and the roof. An 11,036 sq. ft. insulated poultry house in New York cost $1.81 per sq.ft. Both these buildings have earth floors and wall panels were raised with a crane. Crane rental is included in cost figures.

Note: The Portland Cement Association, 33 W. Grand Avenue, Chicago, has a pamphlet on construction details for tilt-up concrete buildings available, as does the Texas Agricultural Experiment Station, College Station, Texas. The University of Nebraska has complete instructions for building a tilt-up grain storage, cattle shed and hog shelter and is preparing directions for a machine shed. Plans utilizing roof trusses spaced 4 ft. apart with a 4 on 12 slope and showing both glue-nail and ring-bolt construction are available from the department of agricultural engineering, Riley-Robb Hall, Cornell University, Ithaca, New York. Details show windows, doors, bracing, paving and a complete bill of materials. This Cornell set costs 75c. Plans for tilt-up Concrete Self-feeding horizontal silos are given in Special Circular No. 426, Agricultural Extension Service, University of Tennessee, Knoxville. Complete plans for the poultry house mentioned above also are available from Cornell and cost 75c.

Rakes "whistle-clean" anywhere!

New offset wheels, "floating" basket, prevent tooth breakage, too.

From New Holland: the advanced Model 56 Rolabar Rake! Its cleaner raking action puts more hay—more dollars—into the windrow. Saves nutrient-rich leaves, blossoms, to cut feed supplement costs.

QUALITY YOU CAN SEE

- NEW OFFSET WHEELS, "FLOATING" BASKET, give cleaner, smoother raking; protect teeth.
- "ROLABAR" ACTION exposes stems to the air for quicker drying.
- BOTH GROUND WHEELS DRIVE—the "56" continues to rake on either right or left turns.
- FAST—rakes full 8-foot swath up to 8 mph.
- LESS HAY MOVEMENT saves leaves and blossoms; *rakes at full right angle.*
- LIGHT-TO-TIGHT WINDROWS through easy crank adjustment.
- PATENTED SPRING-LOADED JACK makes hookup fast, easy.

"Those wheels let you get hay other rakes miss!"

"One grease job keeps it rolling all summer!"

Model 56 Rolabar Rake gently lifts and rolls mowed hay into light, fluffy windrows for fast, even curing. Saves nutrient-filled leaves and blossoms.

HIDDEN QUALITY, TOO!

- EXCLUSIVE 100-ACRE LUBRICATION saves time, trouble.
- SEALED TINE BAR AND REEL BEARINGS give lifetime lube-free service.
- NO IDLERS, BELTS OR CHAIN LINKS to tighten or replace.
- REPLACING TINES IS EASY. Inexpensive tines may be replaced individually.

Ask your New Holland dealer to demonstrate the "56" Rolabar Rake on your own farm; check his flexible finance plan. See all the advantages of owning New Holland quality!

FREE BOOKLET! Write New Holland Machine Company Division of Sperry Rand Corporation, New Holland, Pennsylvania.

NH NEW HOLLAND *'First in Grassland Farming'*

Modern buildings for modern farms from STRAN-STEEL

Here's how to store grain on your farm & save 8.5¢ on every bushel

If storage space rentals are eating into your grain profits, you can change the cost picture with a functional Stran-Steel building for a minimum initial investment. Sealing grain in a Grain-Master puts a ceiling on costs. Take the Grain-Master 24 with a 10,000-bushel capacity. It'll reduce your storage costs to a nickel a bushel from the 13.4¢ a bushel farmers must pay at current levels for sealing their crops and taking a warehouse receipt each year. Savings could amount to $850 per year – year after year! And, Stran-Steel's experience is that the farmer can match the elevator or warehouseman in keeping his grain in good condition.

Get these advantages when you store on your farm:

- No waiting at the elevator during the harvest season rush
- Grain is at hand for feeding or selling at the highest market price
- Grain stored on the farm is readily resealed when desired
- Stran-Steel grain storage buildings are multi-purpose buildings that work for you the year around

GM-24
Farm Size

Two popular sizes to fit any farm or ranch needs.

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STRAN-STEEL storage buildings to fit any bushel requirement go up in a hurry and are up to stay. Sturdy double-wall construction (optional at slight extra cost) prevents breakthroughs and affords extra weather protection that simplifies the aeration process. The steep roof slope of the Grain-Master matches the natural slope of the grain, adding to capacity and eliminating extra handling. And, unlike round bins, the Grain-Master is entirely suitable for equipment storage or general utility purposes when it is not needed for grain storage.

YOUR STRAN-STEEL DEALER can furnish a storage unit complete with aeration system for dry grain or an automatic drying system for high-moisture grain or ear corn. The drying system capitalizes on maximum use of natural air for minimum-cost drying and, with supplemental heaters, it automatically corrects for adverse drying conditions. Backed by years of research and field use, these systems are designed to meet U.S.D.A. recommendations for safe grain storage and conditioning.

CHOOSE from ten Stran-Satin colors for handsome as well as functional storage buildings. Baked on at the factory, the protective maintenance-free color is on to stay. (Stran-Satin heat reflecting white roofs help keep the grain cool and in good condition.)

GRAIN-MASTER CORN STORAGE ON THE FARM

Mail the coupon or see your Stran-Steel Dealer for one-stop service—planning, building and financing!

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Stran-Steel Corporation, Dept. FQ-3, Detroit 29, Michigan
Please rush new Farm Structures Planning Guide and information on Grain-Master buildings. I'm interested in a building approximately _____ ft. x _____ ft. to be used mainly for _____

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"Stilbosol gives us an extra ½ lb. daily gain"

"That's for both steers and heifers, too. I know that sounds high, but that's what I estimated they did last year," reports Jack Dunlap, Professional Farm Manager, Williamsport, Ohio.

"I quit feeding Stilbosol for a spell last year. Went back to it, though. Why? Because I'm in this business to make money and Stilbosol helps me make it.

"I own nine farms and manage another twenty-two. About 12,000 acres in all. We've got 800 cows and feed out 1,200 to 1,500 head of cattle a year. We also raise 10,000 hogs a year. We sell cattle every month. We've got to. And my steers never did better than this winter (1961)."

Jack Dunlap is a man who speaks with authority. He is a thirty-two-year veteran in the cattle feeding business and is past president of the Ohio Farm Managers' Association. He is also a member of the American Farm Managers' Association and a graduate of Ohio State University.

"You've got to keep abreast of things in this business. And that includes fertilizing for a good corn crop, good breeding practices, practical farm management; and you've got to take advantage of developments like Stilbosol. I'll tell you one thing. I know Stilbosol makes me money," Jack concluded.

After seven years, Stilbosol continues to give feeders an extra 15% gain on 10% less feed.

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Makers of HYGROMIX® (*S. hygroscopicus* fermentation products)

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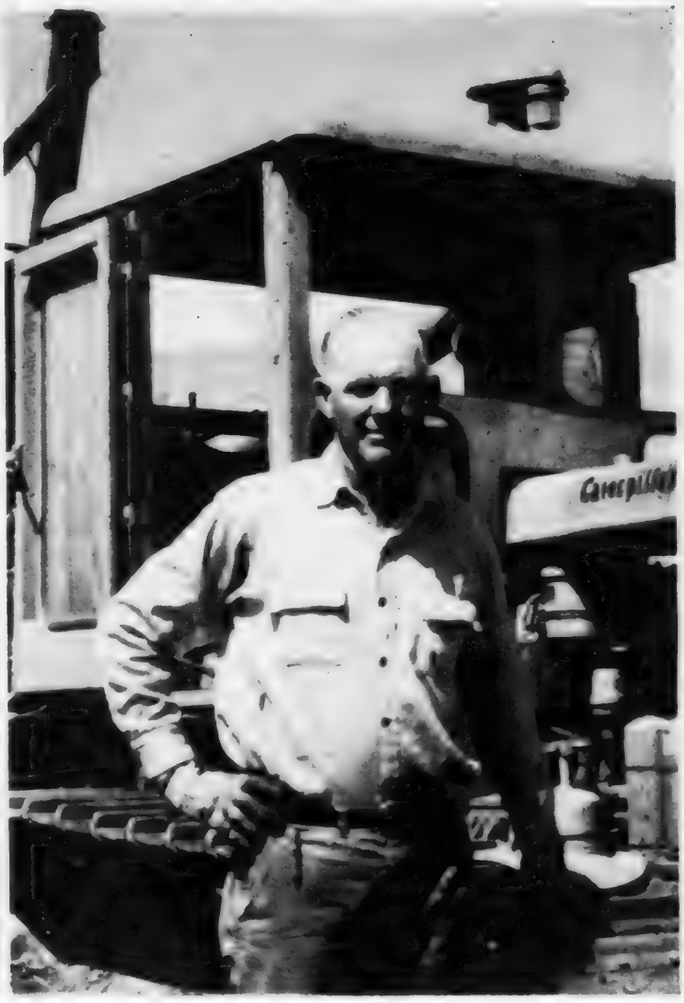

He knows quality...

Lane Rhodes understands the meaning of quality. He owns a choice ranch near Paso Robles, California . . . the Vaquero Water Ranch. He raises quality registered Polled Herefords and proves that quality is reflected in faster gains, lower costs per pound. Cattlemen come from miles around to bid on them at local auctions or at the ranch.

Quality is equally important in selecting equipment, Lane has found. This philosophy has paid off in many ways. With the aid of his two Cat track-type Tractors, he has built the ranch into a highly productive and profitable operation.

He uses his Cat D6 Tractor for the heavy-duty work—discing, harrowing, pulling a harvester, often running it around the clock during rush seasons. Proving that quality *does* count, his D6 operated 9000 service hours before overhaul! Another example of how quality equipment pays off: Lane's older Cat Fifteen Tractor—now 27 years old—is still regarded as the "handyman" tractor around the ranch for its ability to work around the feedlots, handle medium sized jobs, etc.

Just as quality bloodlines pay off in livestock, in terms of lowest of all final costs—higher profits, so does it pay off for equipment. Cat Diesel Tractors are *thrifty*—they burn lowest cost No. 2 furnace oil. Of course, they can also burn more expensive diesel fuels, but they're not required. They're *easier to care for:* lifetime lubricated rollers and idlers; mess-free dry-type air cleaners. And they're easy to operate: choice of push-button direct-electric starting or independent gasoline starting engine. All controls are easy and natural, power boosted where necessary.

Have your Caterpillar Dealer show you the many quality features—explain how quality makes just as big a difference in tractors as it does in livestock!

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SEE YOUR DEALER FOR A COMPLETE LINE OF QUALITY-BUILT FARM TRACTORS AND EARTHMOVING EQUIPMENT

Anaplasmosis

FQ REPORT

THE PROBLEM: To meet the threat of a serious cattle disease; one which is of major proportions in the entire southern United States, California and parts of the intermountain area, and which seems poised to spread throughout the country.

BACKGROUND: Anaplasmosis is a disease which destroys the red blood cells in cattle. It was first reported in South Africa in 1910. Until it was identified as a separate disease in the United States in 1926 it was thought to be a phase of piroplasmosis, the old Texas fever. But Texas, or tick fever, has been eradicated in this country with the almost complete extermination of the tick which transmitted it, while anaplasmosis is causing greater losses each succeeding year. Only the ruminants seem to be susceptible to the disease and it is very rarely reported in sheep. Other domestic animals and man are not known to be susceptible to it.

In anaplasmosis a microscopic body *(Anaplasma marginale)* which gets into the bloodstream, enters the red blood cell and destroys it. The anaplasma is a parasite. Further than that we know very little about it.

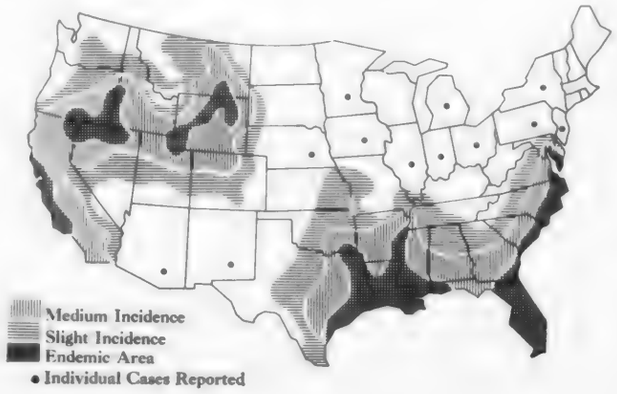
In acute cases the cattle run a high temperature and turn pale or yellowish around the eyes. They may stagger some as they walk and they have a difficult time breathing. As high as fifty percent of acute cases result in death. In most cases death is probably caused by suffocation brought about by the inability of the blood to carry oxygen because of the destruction of the red cells.

While anaplasmosis attacks cattle of all ages, young stock seldom show any of the signs of the disease. Only individuals 10 to 12 months of age and over are subject to the acute form. Those which recover, as well as those which contract the subacute form when young, commonly remain infected with the anaplasma bodies for years afterward. These apparently healthy animals are carriers, and a continual source of infection.

TRANSMISSION: The disease is spread by the introduction into a healthy animal of blood from an infected animal. Ticks, biting flies, mosquitoes and other insects are the chief agents in this transmission—the vectors. Man, himself, is far from innocent. Dehorning, castration, earmarking, vaccination and similar bloodlettings, even of minor proportions, afford opportunities for the transmission of the anaplasma-infected blood to healthy animals.

RECOGNITION: Anaplasmosis is difficult to diagnose. Its symptoms are easily confused with leptospirosis and other diseases. The only positive checks currently in use are a microscopic examination of the blood of the animal with an apparently acute case; or the use of the newly developed complement-fixation test to discover carriers. The anaplasma can be seen in the red cells of the acutely afflicted animal but not in the blood of the carrier animal. This is why the complement-fixation test is necessary for the discovery of carriers.

The disease sneaks up on a herd like a time bomb. It takes about four weeks from the time the anaplasma are introduced into the blood until the cattle show signs of sickness. Then the attack breaks forth violently. Infected animals run a high fever, they are markedly depressed, their breathing is labored, they have a staggering gait, they become pale or yellow around the eyes, and some may have an inclination to attack anyone who approaches them. Blood drawn from them is thin and watery. Animals may be found dead without any previous visible symptoms. Abortions may occur due to the high temperatures and lack of oxygen in the blood. After a few days the attack abates and those animals which survive remain carriers and a potential source of infection. To justify a suspicion of anaplasmosis the following conditions should be present: The cattle are usually past yearling age; there are usually symptoms of anemia and icterus; the time of year should be taken into consideration, the attacks occurring chiefly in summer and early fall; and there should be anaplasma-carrier cattle in the area.



TREATMENT: Present methods of treatment are not always satisfactory. Any exercise or excitement may cause immediate death to animals in an acute condition.

There are no do-it-yourself kits for the treatment of anaplasmosis. First a laboratory examination of the blood is required to determine whether the animal is affected. Then it takes all the skill of a veterinarian to pull sick animals through.

Fair to good results have been obtained in the treatment of acute cases by the use of antibiotics, particularly chlortetracycline and oxytetracycline. The dose is given intravenously to get the antibiotic into the bloodstream in the shortest possible time. Usual dose is 1 gram per 1,000 pounds live weight of the animal. Blood transfusions are sometimes helpful in acute cases—carrier cattle can even be used for donors. Cost limits transfusions except in the case of very valuable breeding animals.

Whether carrier cattle can be cured is something of a question at this time. Some veterinarians and research workers are of the opinion that no known drugs are capable of knocking the anaplasma bodies out of carrier cattle. Dr. W. E. Brock of the Department of Pathology, College of Veterinary Medicine, Oklahoma State University, however, states, "carrier cattle may be cured of the infection by sufficiently large doses of tetracycline antibiotics. The parenteral injection of 5 mg. of tetracycline per pound of body weight daily for 10 days, or the same daily dosage orally for 60 days, will destroy carrier infection. The high oral dosage will cause diarrhea, anorexia and weight loss for the first week, but the cattle return to normal rapidly after that time. The antibiotic food should be kept before them during this time."

CONTROL AND PREVENTION: The key to control and prevention lies in reducing the possibilities for transfer of blood from diseased and carrier animals to susceptible cattle. This dictates such measures as proper sanitary techniques in dehorning, castrating, and so on; the control and eradication, if possible, of all arthropod vectors—the ticks, mosquitoes, horseflies, deerflies, etc., which carry blood from diseased to susceptible animals; and the identification and isolation of sick and carrier cattle.

All knives, saws, needles and other instruments should be wiped and sterilized before and after each individual use.

Insect control should be practiced: spraying, draining surface water in pastures to reduce the mosquito population, and brush control to eliminate the gathering places of horseflies and deerflies.

Oral dosage during the anaplasmosis season of 0.5 mg. of the tetracycline antibiotics per pound of body weight, is suggested by Dr. Brock as a method of prevention. The drug may be given mixed with feed or with a pasture supplement.

The final step is the use of the newly standardized USDA complement-fixation test to discover carriers. The reactors can then be isolated or sent to slaughter. A sample of blood is sent to a state laboratory where the test is made. The results are obtainable within 24 hourse after the laboratory receives the sample. The Anaplasmosis Research Laboratory, Texas A. and M. College, working in conjunction with the USDA's Animal Disease Eradication Division, Animal Research Service, has just completed the production of 4 million units of antigen for use in these tests. Dr. Ted E. Franklin has been in charge of this work at Texas A. and M.

While the tests are now available on a field scale in only a few states, it is expected that they will soon be available wherever car-

(*Continued on page* 134)

AMERICA'S LEADING FARMERS AGREE:

The bright profitable future of your livestock operation is here now!

HERE'S HOW YOU CAN PRODUCE MORE MEAT AND MILK AT A LOWER COST OF PRODUCTION

The Harvestore® System

of mechanically storing and feeding grain and forage crops

The Harvestore System is the challenging answer to the price-cost squeeze facing many livestock ranchers and farmers like yourself. Thousands of other livestock operators have found that the only way they can produce more meat and milk on the same acres, with less labor, and at a lower cost of production—is the Harvestore way. Read why and how the Harvestore System can make your livestock future a bright and profitable one.

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The quality of the forage and grain you feed, the flexibility of your storage facilities, and sharply reducing labor requirements determine, in a large part, the profit you make in the meat and milk you produce. Harvestore is a scientific crop-processing unit designed to maintain crop quality in storage, feeding flexibility–and diminish labor needs.

Harvestore's exclusive principle of "oxygen-free" sealed storage provides peak nutritional goodness during storage and processing for forage and high-moisture grain crops, so they maintain maximum nutritional value when they are ready for feeding. Here's how it works. Unlike conventional storage units which allow air to frequently contact feed and cause spoilage, the HARVESTORE compensates for the necessary air pressure changes that take place in any storage unit. It does this by "breathing" air in and out of its exclusive breather-bag system. Air contained in the bag can't touch the feed and cause spoilage.

Harvestore's exclusive sweep-arm bottom unloader handles both forage as Haylage in the 40% moisture range or high moisture corn . . . providing unequalled flexibility in farm crop feeding. This combination of oxygen-free storage and bottom unloading brings true and dependable automation to the storing and handling of any feed crop . . . and provides new profit-making possibilities for any livestock farmer.

How the HARVESTORE System can make more money for you

Cut field and crop losses by harvesting and storing forage and grain crops at the peak of their nutritive value—not when the weather dictates. Picking corn early at 20-30% moisture levels and storing in a HARVESTORE saves up to 18% of the crop normally lost through conventional harvesting and storing. Forage stored in a HARVESTORE as Haylage results in savings of up to 20% normally lost through conventional hay harvesting.

Save time and reduce labor by eliminating costly field and extra handling operations. Shell or grind corn directly from the field into a HARVESTORE. Put up hay as Haylage with fewer field operations . . . and with only the turn of a switch, cattle are fed in mere minutes.

Save feed costs. College tests performed only in a HARVESTORE show that HARVESTORE high-moisture ground ear corn produced the same beef gains at 3¢ less cost per lb. of gain compared with crib-stored ground ear corn. Beef cattle fed HARVESTORE Haylage produced 2.18 lbs. of gain per day—without any supplement, corn or grain.

Now, Harvestore provides expert feedlot planning. Why take chances on a feedlot that may not be designed for maximum efficiency . . . or rely on advice that is not qualified to consider or coordinate all necessary phases of feedlot feed handling.

MAIL THE HANDY POSTAGE-FREE POSTCARD TODAY FOR FULL INFORMATION ON HARVESTORE'S FEEDLOT PLANS SERVICE.

Here's "Farm Proof" that the Harvestore System pays off in more livestock profits!

Haylage and high moisture corn produced 3.27 lbs. beef gains per day.

"Feeding trials on our farm showed that cattle fed Haylage and high moisture corn from two Harvestores averaged 3.27 lbs. of gain per day, at a feed cost of $10.41 per hundred lbs. of gain. Our cattle did much better on this ration than they did on corn silage or hay plus corn and supplement."

GUY WILSON, Kokomo, Indiana

40-cow Brown Swiss herd averaged 10,228 lbs. of 4.4 milk with 452 lbs. butterfat.

"I can rely on my Harvestore to keep a constant supply of good feed on hand all the year 'round. I would never go back to the old way of pasturing a few months in the summer and feeding hay or green chop the rest of the year. Haylage is the best feed and Harvestore offers the best feeding system that ever came out."

CLARENCE IMHOFF, Roanoke, Illinois

Cattle got more good out of high moisture corn.

"You should see my cattle go for Harvestore high-moisture shelled corn. They like its flavor and stay on full feed right up to the day they put on the last pound of finish. I think my Harvestore is the most complete automatic feeding system I can buy."

J. E. FLANAGAN, Quincy, Washington

Maintained D.H.I.A. herd average of 13,000 lbs. milk and 472 lbs. butterfat with no supplement.

"I believe my protein savings is due to the fact that I cut my alfalfa in the bud stage, at its highest protein content, before I put it up in my Harvestore as Haylage. My cows also like the sweet, fermented flavor of Harvestore high-moisture ground ear corn."

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I now feed 700 hogs with less labor than it took to feed 200 hogs.

"It only takes 3 minutes a day to feed my 700 hogs, whereas it took an hour for 200 hogs before I installed my Harvestore. I paid for half my Harvestore by feeding 70¢ high moisture corn one year, and am convinced that the other half was paid by increasing the number of hogs I can handle on my farm."

L. V. WARNER, Pierceton, Indiana

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Don't let financing hold up your starting a HARVESTORE PROGRAM for increased profits. If local financing is not available, your dealer will be happy to present the outstanding A. O. Smith Harvestore Purchase Plan.

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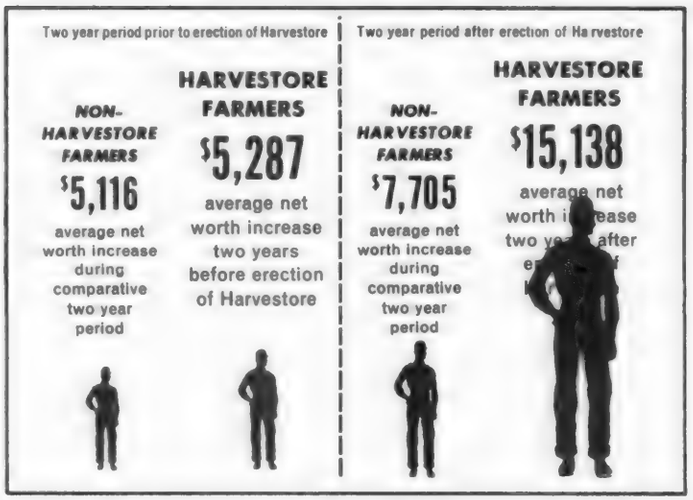
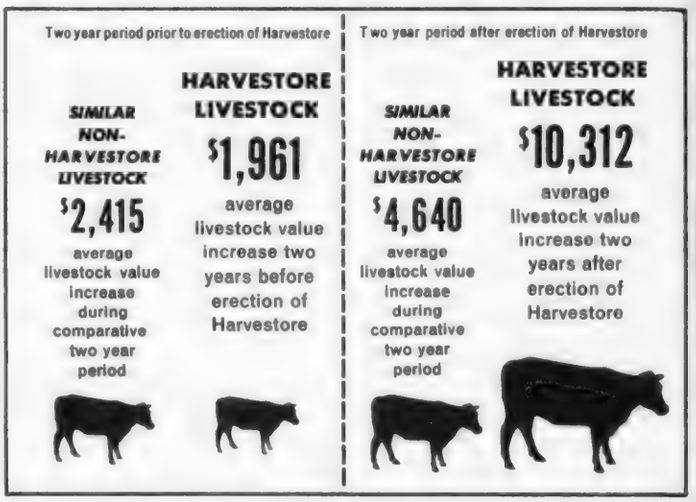
Working with several financial institutions,

a study of net worth of 200 farmers over a 5-year period shows HARVESTORE farmers make more money


Two year period prior to erection of Harvestore
NON-HARVESTORE FARMERS
$5,116
average net worth increase during comparative two year period
HARVESTORE FARMERS
$5,287
average net worth increase two years before erection of Harvestore
Two year period after erection of Harvestore
NON-HARVESTORE FARMERS
$7,705
average net worth increase during comparative two year period
HARVESTORE FARMERS
$15,138
average net worth increase two years after


Two year period prior to erection of Harvestore
SIMILAR NON-HARVESTORE LIVESTOCK
$2,415
average livestock value increase during comparative two year period
HARVESTORE LIVESTOCK
$1,961
average livestock value increase two years before erection of Harvestore
Two year period after erection of Harvestore
SIMILAR NON-HARVESTORE LIVESTOCK
$4,640
average livestock value increase during comparative two year period
HARVESTORE LIVESTOCK
$10,312
average livestock value increase two years after erection of Harvestore

NET WORTH INCREASE OF ALL LIVESTOCK FARMERS

This is a composite picture of all livestock farmers in this revealing survey. Two years before one group installed Harvestores, there was only a slight difference between the net worth increases of these two groups. Look what happened two years after. The Harvestore owners' net worth increase was almost double that of the non-Harvestore owners'...proof that Harvestore owners do make more money.

LIVESTOCK VALUE INCREASE OF ALL LIVESTOCK FARMERS

There was only a two acre difference in the average of Harvestore and non-Harvestore farms in this survey, and only a $454 difference in the average livestock value of these two groups two years before one group installed their Harvestores. Look at the difference two years after. The Harvestore group increased their livestock value an average of $10,312 against $4,640 for their neighbors.

College tests show HARVESTORE processed Haylage and high moisture corn produce cheap gains

2.18 pounds of gain per day on Harvestore Haylage alone—South Dakota Agricultural Experiment Station made a 91-day beef feeding test in which 78 Hereford steers were fed nothing but Harvestore alfalfa-brome grass Haylage stored at 42% moisture. Result—it took 1,508 lbs. of Haylage to produce 100 lbs. of gain, at the rate of 2.18 lbs. per day.

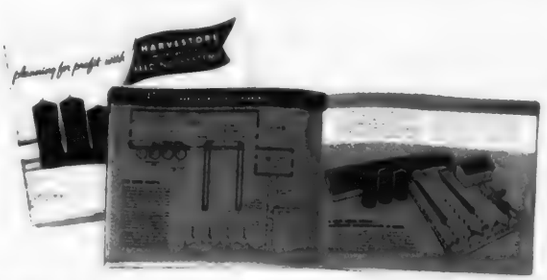
18% greater return per acre from Harvestore high moisture sorghum grain—At Texas Agricultural Experiment Station a beef cattle feeding test showed that Harvestore high moisture sorghum grain gave 18% better returns per acre than dry sorghum grain. According to these test results, this would mean an extra Harvestore return of $2,390 on 250 acres.

$3.00 saving in feed cost per hundredweight of gain feeding Harvestore high-moisture ground ear corn—Purdue University feeding tests show that same gains were made from feeding 12-15% less Harvestore high-moisture ground ear corn than crib-stored ground ear corn. This amounts to a savings of $3.00 in feed cost per hundred pounds of gain.

HARVESTORE Feedlot Plans Service at your disposal

Today's big problem among livestock operators, like yourself, is to produce more meat and milk at a lower cost of production. To do this you must have an efficient, mechanized storage and feeding operation in order to maintain bigger beef, dairy or hog profits.

What is the best feedlot plan for you? Why not let A. O. Smith, through their Harvestore dealer family, provide you with expert feedlot plans service. Feedlot consultants with experience in laying out completely mechanized storage and feeding systems are at your service. Your Harvestore dealer will be glad to help you.



HERE is an actual feedlot installation

Here is one of 12 feedlot plans you will find in your copy of the Harvestore Feedlot Plans Book. This is a layout of an actual installation in which the cattle barn and previous feedlot were incorporated without losing any efficiency. Dotted line shows direction of blended ration of high moisture corn and Haylage as it is augered to mechanized feed bunks. Dotted outline shows proposed location of an additional Harvestore which will be needed to take care of an anticipated expanded operation.

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Silo Size

FQ REPORT

PROBLEM: To estimate the silage capacity needed on a farm, and the silos required.

BACKGROUND: A farmer may have to plan silos and silage-handling equipment completely from scratch. More often he will figure additions to existing silos. In either case, he must work out how much silage to store and the best sizes of silos to hold the needed silage.

Several factors are involved:

1. The minimum amount of silage for an operation using modern machinery is probably 100 tons a year. Quantities less than this usually cost too much, as the cost of filling can rise to as much as half the fair price of the silage. Example: The corn silage in a 10x30-foot silo holding about 50 tons at $6 to $11 per ton (depending on dry matter and grain content) would be worth between $300 and $550. It would be easy to spend $250 for labor and equipment to fill this silo. The farmer would be better off using hay.

2. Silage consumption is at best a rough estimate, for it varies with the animal and the silage. Dairy cattle: Minimum 50 lbs./day per 1,000 lbs. live weight. Maximum 100 lbs./day per 1,000 lbs. weight. The minimum is set by economics; the equipment necessary to fill a silo and feed silage is not justified at much under 50 lbs. per animal per day.

Maximum consumption will vary with cattle and silage. It takes good silage and good management to feed 100 lbs./head daily to a dairy cow the year around. Low palatability or high dry matter content will reduce this maximum rate. The dry matter content is important. It works in this way: 50 lbs. of 25% dry-matter silage gives 12 lbs. of dry matter; 50 lbs. of 40% dry matter silage equals 20 lbs. of dry matter. A cow will be much more likely to eat 50 lbs. of 40% dry matter silage than 100 lbs. of 25% dry matter. The palatability of the 40% silage is likely to be better.

Some wet silage may be good enough to incite a dairy animal to eat 100 or even 120 lbs. of silage a day for 3 or 4 months, but seldom for 12 months. An animal may refuse 100 lbs. of 20% dry matter silage, but accept a continuous ration of 80 lbs. of 25% dry matter silage. Both contain 20 lbs. dry matter.

Beef Cattle: Silage requirements for beef are lower. With breeding stock a reasonable figure is 50 to 60 lbs. of corn silage per 1000 lbs. of live weight, or nearly the whole ration. For fattening animals weighing about 900 to 1,000 lbs., 9 to 15 lbs. of corn silage a day is good. For lighter animals, figure correspondingly more. Young calves usually get more per 1,000 lb. live weight than animals on a finishing ration that includes silage.

Sheep: Pregnant ewes might get 2 to 3 lbs. of silage a day, and fattening lambs 1½ to 2 lbs. per head per day. For both, this works out to 20 lbs. silage for 1000 of live weight.

3. A reserve capacity for silage is wise. The ideal is 50% above annual needs. This allows carryover for bad growing seasons and latitude for extra good crops. Some years it may pay to feed more cattle.

4. There are many advantages to multiple tower silos. These permit feeding from one or two while filling another; different silages can be made in each, and fed together. The filling season can be spread to cover various crops without interrupting feeding. And it is easier to plan feeding. It is desirable to have all silos the same diameter, and in line, so one unloader will fit them without adjustment. Some unloaders can move on an overhead rail between silos.

TECHNIQUES: Assembling the factors is simple.

Example: 45 dairy cows on maximum silage. Each eats 100 lbs. a day. That's roughly 18 tons a year each—assuming they'll eat green chop at silo filling. The total consumption is 45 x 18 tons—810 tons. Now add 50% reserve—405 tons. You need 1215 tons of silage capacity for 365-day silage feeding. From the table below, that's one silo 30 x 60. Many farmers want to make only corn silage. But meadow or hay crops make excellent silage when properly treated. They should be in a silo separate from the corn. Three silos, all 18 x 60 or 20 x 60, will give the most flexibility, in availability of feed and rates of feeding. To avoid spoilage, remove at least 5 lbs. per square foot per day from any tower silo. This is about 3 or 4 inches at the top of the silo, and around 1½ to 2 inches at the bottom.

Horizontal Silos: Estimate the contents of any flat silo—pit, trench or pile—at 40 lbs. of usable silage per cubic foot. This is 50 cubic feet per ton. For the example above, you'd need about 60,000 cubic feet, or a pile 10 x 30 x 200 feet. With horizontal silos it is possible to put some of each crop produced into the same silo in layers, and feed them at the same time. They are mixed for feeding by slicing vertically on the face of the silo.

Covering and opening 6,000 sq. ft. of horizontal silo between fillings is no small job, but it must be done to prevent spoilage. The protection must be good, yet easily removable, like a plastic sheet.

Actual results may differ by up to 10% from the table, as several factors alter the holding capacity of a silo. They are: rate of filling, method of filling and type of crop.

Slow filling—over a period of days or weeks—will enable you to put much more crop into a silo than rapid filling. This is because of settling and runoff.

Different methods of filling alter the packing of the silage. A blower, unmoved, makes a single, solid core within the silo. A distributor spreads the crop, making a dense shell of heavy material close to the sides. This type of fill contains more silage.

More tons of a crop at 20% dry matter will go into a silo than of the same crop at 30% dry matter, because the wet crop compresses faster than the dry. But it will lose more liquids. The final density of most grass silages can be from 4 to 8 lbs. per cubic foot greater than corn silage. There may be more runoff, too. This table lists the takeout, not the input. The runoff is not counted. It is possible to put 90 tons of a crop into a 60-ton silo when filling with sopping-wet crops. You lose a large amount of liquid during the process, and some of the best nutrients. Therefore, ensile at 30% dry matter or more.

For maximum tonnage use slow filling, a distributor, and pile the crop above the top of the silo using netting or picket fencing to hold it until it settles. But there'll be a limit to the final height of silage in a tower if an unloader has to sit on top.

With a horizontal silo, increased depth will increase the density of the silage, and so raise tonnage capacity. So will prolonged compaction when filling, and heavy covering such as soil.

Tonnage Capacity of Tower Silos

Corn or Grass Silage at 30% Dry Matter

DEPTH OF SILAGE	SILO DIAMETER										
	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
30′	49	70	96	125	158	195	236	280	330	382	440
32′	53	77	106	135	172	215	260	309	364	422	483
34′	59	84	114	150	190	234	284	336	396	458	527
36′	63	92	124	161	205	254	308	365	430	499	572
38′	69	99	135	176	222	274	332	394	463	537	617
40′	74	106	145	189	239	295	358	423	500	578	663
42′	79	114	155	203	255	317	384	455	537	620	713
44′	85	122	166	217	274	339	410	487	573	665	763
46′	89	130	177	230	292	361	437	518	610	706	813
48′	95	139	187	246	311	384	465	552	650	753	865
50′	102	147	200	261	330	407	492	583	688	795	913
52′	108	155	212	277	350	431	522	620	730	845	970
54′	114	163	224	293	370	455	550	655	770	890	1020
56′	120	171	236	309	390	480	580	690	810	940	1080
58′	126	179	248	325	410	504	610	725	870	990	1130
60′	132	188	260	341	430	529	640	760	910	1030	1190

Oliver 25 saves 97.2% of corn crop in test

In a one-hour field test, this Oliver combine shelled 229.2 bushels of 22%-moisture corn from 2.23 acres—and saved a phenomenal 97.2% of the crop. Its efficiency was based on national corn harvesting contest rules, and there were no times-out for turning or unloading.

Here's proof that the sturdy, rugged Oliver 25 is built for corn—the toughest crop of all to harvest. Capacity-matched threshing, separating and cleaning units enabled it to wade right through this dense, 105-bushel Ohio stand without slowdown.

The No. 12 corn header can be interchanged quickly with a grain platform by one man. Its long, floating shields and three roller gathering chains per row save down stalks. And stripping bars above the fluted snapping rolls pop off ears before they can be pinched or shelled. Under normal conditions, ears never reach the rolls.

This Oliver 25 is the practical all-season, all-purpose harvester for you. *It's sized right and priced right* for a farm of any acreage. Oliver Corporation, Chicago 6, Illinois.

Now! Earn 6% on cash or trade

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Turn to your dependable Oliver dealer when you need hurry-up service and genuine Oliver spare parts.

You can cool milk in this tank from the Granddaughters of your present herd...

That's right! The Solar Bulk Milk Tank is built to last . . . . built to make your first tank investment a lasting one! Solar uses all 18-8 stainless steel . . . . no mixed metals in tank shells, coils and lines that help create corrosion and shorten tank life. What's more, Solar's controlled flow expansion system plus the largest cooling plate of any tank give you quick, low-cost cooling. Here's something else . . . . the Solar Program completely spells out the extra values of financing, servicing, and warranties that can be yours. Before you buy, write direct or get the full story from your Solar Dealer on the bulk milk tank that's BUILT TO LAST!

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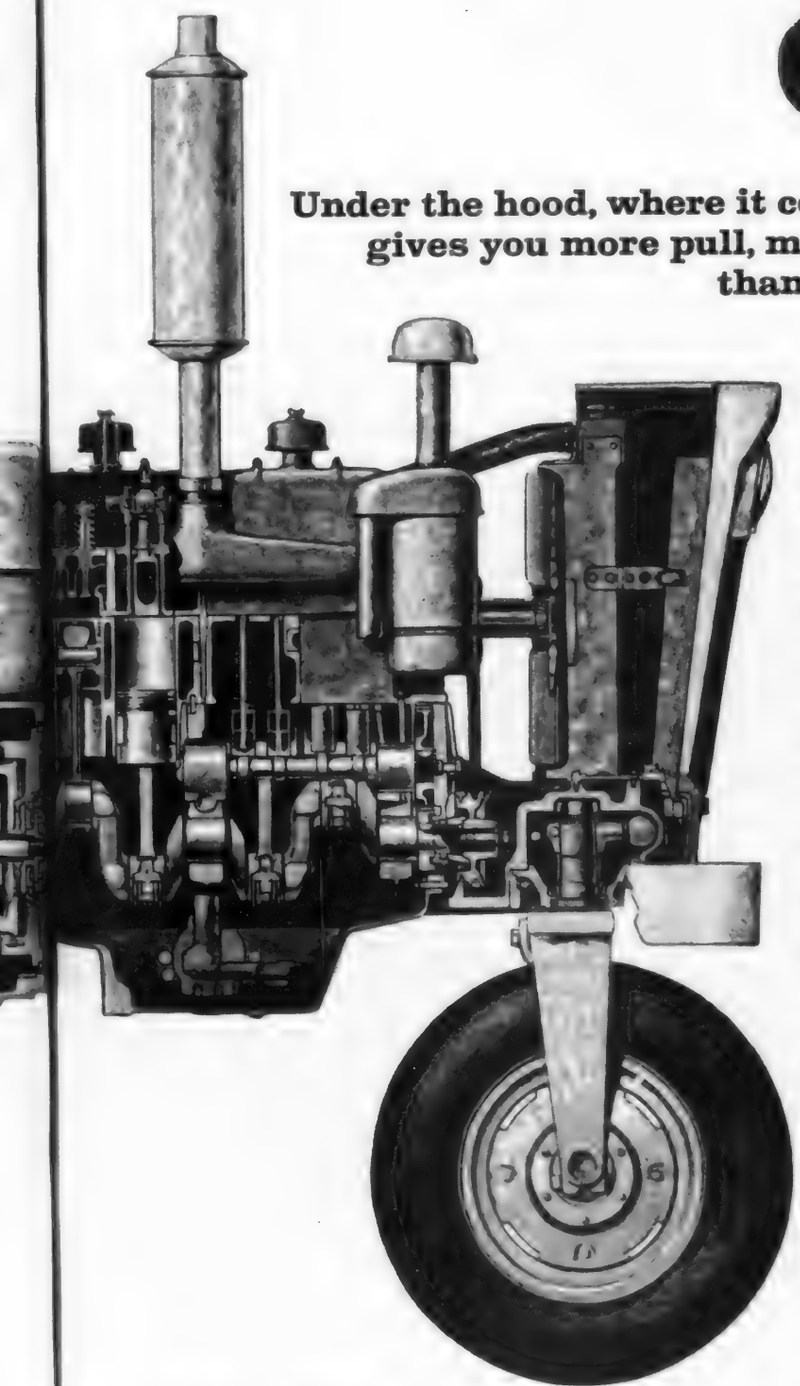
Please Check One: ☐ Producer ☐ Sanitarian ☐ Student

Guts is what you get in Moline's new M5 tractor !

FARM • MATERIALS HANDLING • CONSTRUCTION AND POWER EQUIPMENT • ENGINES • TRANSMISSIONS • CHAIN SAWS • ELECTRONICS

Under the hood, where it counts, Moline's 65 hp M5 gives you more pull, more power, more features than any other 5 plow tractor



Power was the watchword when we engineered the M5. Look at the size of those cylinders. We beefed up the engine to 336 cu. in.

Those extra large pistons push connecting rods that are two to three times the size of those in automotive engines. That huge crankshaft is drop forged and heat treated. Because of bigger cylinders and huskier parts, this Moline-built engine develops peak torque at less than 1000 rpm. That's unmatched lugging power; a full 65 hp on the pto!

This power is put through the M5's Ampli-Torc transmission (standard equipment) which gives a double range of ground speeds for extra convenience. The transmission and final drive are built to do twice the work you can ever put them to. Notice, too, how the crankcase, transmission and rear axle are heavy cast and bolted directly to each other. Here is a solid, unshakable column of strength. It won't twist under the heaviest load.

Only the M5 gives you a 336 cu. in. engine; 10 speed transmission; Ampli-Torc drive; Tele-Flo hydraulics; three point hitch; automatic draft control; *plus* man-saving Control Zone Comfort. See how comfortably the operator sits and how the controls are in easy reach.

No wonder the M5 plows more acres per day, goes through tougher ground, leaves you fresher at sundown than any other tractor in its class. Step out and away with new muscle power, *real* 5 plow power. Test drive the new M5 Tractor at your Moline dealers today. Available with gasoline, LP gas and Diesel Moline-built engines.

MINNEAPOLIS MOLINE®

MOTEC

Farm Equipment Division of MOTEC INDUSTRIES, INC.

The Dairy Barn

Improved Vacuum

Babson Bros. (Surge) have introduced a milking system with the milk line located below the milking level. Milk flows downhill from the udders to the milk receiver. The idea is to eliminate mixing air with milk—a possibility where milk is drawn up through risers. Both the vacuum line, located at usual height, and the low milk line have their own individual pump and both can be washed in place, so vacuum-line blockage should not be a problem.

Heat Tolerance

In the winter of 1959 Bill Judge took 40 Jerseys from New Vienna, Ohio, to his home in Orlando, Florida. The cows made a better record their first month in sunny Florida than their last month in snowy Ohio. Judge thinks Jerseys stand up better under the heat than Holsteins, which made up part of his herd in the past. The USDA has made some temperature studies that tend to support Judge's opinion. In a climatic laboratory in Columbia, Missouri, milk production of all breeds dropped sharply as researchers boosted temperatures above 75 degrees with the relative humidity at 65 percent. Jerseys and Brown Swiss did not fall off in milk yield as sharply as Holsteins. However, cows within a breed varied much more sharply in their response to high heat and humidity than breeds as a whole. This helps account for the fact that a neighbor of Judge's still swears by Holsteins.

Judge said to fight the heat he keeps all his cows in drylot with high roofs over them. The last galvanized roof he put up was 12 feet aboveground. He explained: "We always seem to have a breeze in Florida, and the high roofs help get the air to the cows." The USDA researchers in Missouri measured the relief provided by wind. Winds of 5 and 10 miles per hour brought milk production nearly back to normal when the temperature was 80 degrees. Winds at nine miles per hour restored from 41 to 77 percent of production losses due to a temperature of 95 degrees.

Premium for Protein

There's been talk among dairymen in this country about the possibility that protein content may someday affect the size of the milkcheck. In Friesland, the province in Holland which contributed half the name of the Holstein-Friesian, this possibility is a reality. Instead of getting paid solely on the basis of fat as was the case before the new pricing system, Friesian farmers now get their checks figured on a formula that takes account of milk protein. Herds producing milk relatively high in protein can get up to four percent more for their milk. For example, last June prices at Dutch cheese factories paying on the basis of fat alone, ran about $2.03 per hundredweight for milk with 3.3 percent fat. At a Friesian plant the price was $1.54 per hundredweight for milk with 3.3 percent fat plus another 57 cents if this same milk had 3.1 percent protein. So the shipment yielded eight cents more per hundredweight at the plant paying for both fat and protein than at a plant paying for fat only.

Protein content is established at the farm by a blue dye that changes color intensity depending on the amount of protein present. This test was invented in Norway. About half the cows in Friesland are on a test similar to DHIA in this country in an effort to cull low-protein producers. Protein content of milk is highly heritable; cows in the same herd easily vary as much as ¾ percent in protein content. It might be well for dairymen in this country to take note of the protein test for their milk, so they'll know what they're up against should the European protein test follow European cows across the Atlantic.

Help at the Store

Farm equipment dealers are starting to meet the challenge put by agricultural engineers who advise comprehensive blueprints for farmstead expansion (Farm Quarterly, Spring 1961). New York dealers had a conference on just this subject last February. Said John E. Scofield of the Kinderhook, New York, Farm Equipment Corporation: "In my area, most farms are dairies and they have about all the field equipment they need. Farmstead mechanization is my big market. But this involves more than selling single tools piecemeal. We must accept the responsibility of being a contractor and do a complete job. This is the only thing we can offer farmers over a direct-from-the-factory purchase. We must do more. After laying out a mechanization plan we must arrange for financing at the bank. But all these services shouldn't be considered a free favor. I studied farm engineering for years and spend a lot of time every day catching up on the latest developments. My fee for consulting work is part of my 'profit.' This shies away some customers at first, but they soon come to know that complete planning is something they just can't afford to do without."

Sputnik in the Stable

With Sputniks swinging from the barn rafters you're guaranteed a conversation piece when someone stops to kibitz. You'll also get good insect control starting about two weeks after they're hung, according to their manufacturer, Delmer Engineers, 6770 E. Gage Avenue, Bell Gardens, California. A sweet-smelling insecticide with Lindane as the active ingredient creeps up along a wick from a Sputnik-shaped container which swings from the ceiling by a wick. Why Sputnik? "Because results are out of this world," Bill Delmer said. "Flies are attracted to the wick, taste a dab of fly-poison, then go away and die."

For farm use, he suggested hanging the wick with Sputnik at the bottom, from a bottle of his fly-killer. Wicks can be longer, as insecticide seeps up from the dispenser and down from the bottle at the same time. Units should be hung as close as 12 to 15 feet from each other if the flies are thick. They are approved for the milkhouse as well as the barn because so little toxicant seeps out of the bottle at a time. The devices are priced at 12 for $10. Refills are needed no more than once a year. Baits in general are about the best bet this summer for controlling insects in the barn. Using Sputnik might put some fun into the baiting job.

GEHL SELF-PROPELLED

FAST... RUGGED... POWERFUL

GEHL HAY PICK-UP

Attach Gehl's Hay Pick-Up to the Self-Propelled Chop-All and watch the action. You can pull in the heaviest crops any 16-foot windrower can lay down. A spring mounted, 22-inch diameter auger keeps continuous floating pressure on hay as it's pushed to packer wheels and compression rollers. Gives you cleaner, shorter cut forage.

The Chop-All, with 1- or 2-row corn head, mower bar or hay pick-up unit, is also available in pull-type models. For complete information on this rugged, heavy-duty, high capacity equipment see your Gehl dealer or mail the coupon directly to us.

Gehl's fast, rugged Self-Propelled Chop-All powers its way through your corn no matter what the condition... tall, short, down, bent, tangled. Goes through two rows at ton-a-minute capacity. Groundline gathering chains pull in every stalk. Radial shearing gives shortest, most uniform cut possible. Gehl's big 109 h.p. engine easily handles any chopping job.

The Gehl Self-Propelled Chop-All has speed, too... from 1½ to 16 m.p.h. Tractor-sized tires carry the engine's entire weight. Give you earth-hugging traction even in soggy-soft fields.

Get the feel of a Gehl for yourself. Swing it around those corners. Notice the easy handling... and the hydraulic controls within easy, convenient reach of the up-front seat. Makes riding and driving more comfortable for you. Mail the coupon for complete information.

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102 YEARS OF SERVICE

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"FOR STEADY CRAWL OR SPEEDY HAUL, EATON 2-SPEED AXLES ARE GEARED RIGHT"

— says Farmer James A. Petty, Wayside, Miss.

"We grow soy beans, cotton and oats on 1140 acres. During our four busiest months, our two trucks have to keep on the move in the field and on the highway. There's no time for trouble. That's why we're equipped with Eaton 2-Speed Axles.

"The Eaton 2-Speed has been saving us time and money since 1957. This Delta country gets pretty bad after a rain. When we had single-axle trucks, bog-downs were a constant problem. But now, with Eaton's low-gear range supplying the pulling power, we get through easily and safely . . . never lose valuable time in the field.

"While harvesting, the Eaton gears down to a slow, steady crawl. No single-speed axle could do that. What's more, on the highway the Eaton gives us the speed we need. In our business, where every minute is money, we can deliver our goods to market about 20% quicker. And we save on maintenance costs in the bargain . . . because the Eaton 2-Speed is easy on the engine, even under our heavy work load."

Discover the many advantages of the Eaton 2-Speed Axle for yourself. Ask your truck dealer for a demonstration.

"EATON LETS US LOAD TO CAPACITY," continues Mr. Petty. "With the extra pulling power the Eaton gives us, we've been able to haul more in less time than we ever could with a single axle truck. And because the Eaton keeps engine RPM down, our gas bills have gone down, too. I say the Eaton is one of the best investments we've ever made."

FORD DEALER W.T. BROWN, England Motor Company, Greenville, Miss., reports: "Our customers have nothing but praise for the Eaton 2-Speed. They find Eaton-equipped trucks do an outstanding job in this kind of country. And that's not all. In addition to all the power and performance advantages of the Eaton, farmers can expect a much higher trade-in."

2-SPEED TRUCK AXLES

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New F-100 Styleside gives you new durability with huskier frames and cabs . . . new convenience with wider tailgate and positive snap catches . . . new riding comfort with longer wheelbase and smoother-acting springs!

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A NEW '61 FORD PICKUP

ALL around Economy Champions—ALL new for '61

NEW '61 FALCON PICKUP—

delivers up to 30 miles per gallon!

Now! 144 Economy Six or optional 170 High-Performance Six!

All the flair and comfort of a Falcon car; all the savings, too! Can deliver up to 30 mpg! Saves on oil . . . 4,000 miles between changes! Aluminized muffler lasts up to 3 times longer than ordinary types! See it at your Ford Dealer's now!

*Based on a comparison of latest available manufacturers' suggested retail delivered prices.

You save right from the start with '61 Ford Styleside pickup trucks for they're priced below* all comparable pickups!

Pay less for gas! Save with Ford's modern 223 Six—winner of 1959 and 1960 gasoline Economy tests against other leading makes!

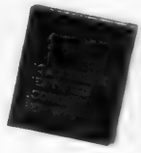
Pay up to $150 less for tires! Certified tests prove that, on Ford's true truck front suspension, tires last up to twice as long as on some other makes. In 50,000 miles, this can save $150!

Up to 16% more loadspace! New one-piece, cab-body design gives greater loadspace—smarter styling and greater strength, too!

FORD DIVISION, Ford Motor Company

FORD TRUCKS COST LESS

YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE!



BELL SYSTEM ANNOUNCES A PROFITABLE NEW FARM COMMUNICATIONS TOOL THAT SAVES MAN-HOURS AND IMPROVES EFFICIENCY

FARM interphone

Interphone gives you phones where you need them

The Interphone system provides telephones at important work locations in the outbuildings. These phones are tied in to the main station in the house. You can take or make calls from any of them. No need to miss or postpone important calls. The people you do business with are as near as your closest phone. These handy extensions are used exactly as you would use a regular telephone. Incoming calls can ring all locations.

Interphone gives you and your wife intercom between all phone locations

Each Interphone station has a compact "speaker-microphone" that is interconnected with all other stations. This enables you to talk back and forth between these locations just as you would in ordinary conversation. If you wish, you can even converse "hands free" by speaking *toward* the speaker-microphone from several feet away.

From the house station your wife can "hold" an outside call while she talks with you on the intercom—then she can relay your instructions, or you can pick up the telephone and speak directly to the caller. This helps make your wife a business partner rather than a messenger. She stays in the house—you and your help stay on the job.

Interphone gives you
outdoor loudspeakers where you need them

This Interphone feature keeps you in touch when you're outdoors around the farmstead. You can be called over this loudspeaker – and you can answer back "hands free" from considerable distance. The loudspeakers also allow a person in the house to monitor disturbances around the farm.

Interphone also gives you
these extra benefits

1 Interphone keeps you in the driver's seat. Use it to instruct hired help or locate a person around the farmstead. Everyone knows what he's supposed to do. So, you get more done in a day.

2 In an emergency a person on an Interphone farm can make his voice heard all over the farmstead through one or more stations. You can't put a dollar value on this benefit.

3 A multitude of day-to-day Interphone uses makes farm living more pleasant than ever before. It's used to trade information, keep track of the youngsters, call the family to dinner.

Farm Interphone was designed exclusively for farm use. It can save many times its cost by helping you make the most of your time and opportunities.

Interphone is a boon to farm wives, too. Using Interphone they can now trade information or call their husbands to the phone without running between the house and buildings.

Interphone is designed so that it can be installed to fit the needs of each individual farm. You can have the stations you need—where you need them, in the colors and styles of your choice. Interphone is easy to use. Its operation quickly becomes second nature to farm folks who have it. The cost is low—equipment is maintained in perfect working order at no additional cost.

BELL TELEPHONE SYSTEM

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Electric Fences

FQ REPORT

PROBLEM: How to install a safe, reliable, effective electric fence with a minimum expenditure of time and money.

BACKGROUND: Building fence has always been an expensive and time-consuming farm job. Ever since it became evident that a charge of electricity on a wire would repel livestock, farmers have been using the idea to hold their cattle, horses, hogs, and even sheep and goats.

Putting a charge on a wire is no trick at all. But to hold that charge within safe limits while at the same time making it an effective deterrent to livestock under varying climatic and environmental conditions takes some doing. The effectiveness of a system depends upon the charger and the installation of the fence.

MATERIALS: A charger, ground rod, fence wire, posts and insulators are the parts of the system. The charger is the key to the entire operation. And here the fence builder immediately runs up against a confusing situation. Which charger should be selected out of the score or more offered on the market today? A large number, some apparently among the most effective, carry no label of approval by the Underwriters' Laboratories, the Wisconsin Industrial Commission, or other agencies established to certify to the safety of various types of electrical appliances. Is such a charger safe?

The only answer to that question is that there are some unlabeled chargers which are apparently quite good and quite safe. There are others which are downright dangerous. All those bearing the Underwriters' Laboratories, Wisconsin, or Oregon labels can be recommended as safe, though in many cases their effectiveness, as compared to some of the uncertified models, may be limited.

Some models bear no label because they have never been submitted for inspection, their manufacturers feeling the present inspection standards are outmoded. Others would never pass any test based upon even the most lenient standards.

For some time a committee of the American Standards Association has been working on a new set of standards for electric fence controllers. Prof. F. W. Duffee, of the University of Wisconsin, chairman of the sub-committee working on specifications, reports its work has been proceeding slowly and no recommendations are expected for several months. When those recommendations are released farmers should have some standards.

The best recommendation at this time is to purchase a charger made by a manufacturer with an engineering background. Many chargers are put together by mere assemblers. Such assemblers may be putting together all the components of a potential fireball.

There are four types of chargers:

The Battery Charger. This uses a 6-volt hot shot battery. It energizes a mechanical interrupter system, producing an electrical shock through an inductive coil. The current travels from the interrupter to the line with 50 to 55 shocks per minute. Each shock lasts about $^1/_{50}$ second.

The Inductive Discharge System. The current is fed to an interrupter device called a circuit breaker or chopper which energizes a current limiting transformer. The shock from this transformer goes to the fence. This is the weed-burner type of charger. If an accurate interrupter is used to properly regulate the "on" and "off" period, and the output current is limited to specified values, these units may now be approved. Both mechanical and thermal interrupters are in use. The weed burner uses a thermal interrupter, and, as presently constructed, will not meet the Underwriters' or Wisconsin specifications.

The Capacitor Discharge System. The power line is rectified to direct current and the current is stowed in the capacitor. The capacitor is triggered to a transformer by a synchronous mechanism and the current flows from the transformer to the fence. The shock is on the fence for only $^1/_{2000}$ second with 60 shocks per minute.

The Continuous Current Type. In this charger a transformer regulates the flow of the current from the powerline to the fence.

About weed choppers: Practically all fence charger manufacturers make a weed chopper model, but at least one which includes such a weed burner in its line of chargers states flatly that the industry, farmers, and all concerned would be much better off if the manufacture and sale of such devices were stopped completely. "Any charge which will burn a weed will burn a barn." is the indictment. And parodoxically, while the weed burner will actually burn the individual dry weed which touches the fence wire, its strength is sapped completely when a great mass of weeds or grass grow up to the wire, particularly in wet weather. The typical weed burner delivers a relatively low charge (about 300 volts) with a short circuit current of about .017 amperes for a relatively long "on" period (in some instances a full second). The Underwriters' code calls for an "on" period of no more than $^1/_{10}$ second with no more than 40 milliamperes of current (.040 amperes).

As it seems to be the length of the "on" period rather than the size of the charge which determines both the safety and the effectiveness of the fence, two manufacturers now make chargers which work regardless of the plant growth and will carry through a heavy growth of weeds by delivering a charge of some 3900 volts but with on "on" period of not more than $^1/_{2000}$ second, with a full second "off" period. The short circuit current delivered by this controller is 2 amperes. This heavy charge overcomes leakage while the extremely brief "on" period keeps it from burning or from being dangerous to either humans or livestock.

Another model is currently advertised as needing no insulators when attached to wooden posts. *Dry* wood is a good insulator and so long as the post remained dry all would probably be well. If sappy posts were used, however, or once the rainy season set in, the effectiveness of such an installation would be drastically reduced.

Lightning arrestors are essential for the protection of all controllers, particularly the highline models: and the fence itself should have lightning arrestors at each end. The highline model should also have fuse protection. Battery models should be equipped with an on-off switch.

Fence wire: Most manufacturers recommend barbed wire of 12½ gauge. The livestock can see this more readily than light gauge smooth wire and the barbs penetrate the hair causing shock to be felt before the animal puts its full weight against the wire.

Posts: The posts may be wood or metal. The end and corner posts should be well braced. Light wood staves, metal T-posts, or even ⅜" steel rods make effective line posts.

Insulators: Insulators should be used on every post. Porcelain insulators are still the best. A new porcelain insulator has polyethylene sleeves which cushion the porcelain from hammer blows on the nail-head. A number of good plastic insulators are now available. Rubber deteriorates too rapidly to be used for insulators.

Ground rod: The ground is one of the most important elements in an electric fence system. The shock is completed when the animal touches the wire and the current passes through the animal to the ground and back to the controller. For this reason it is a simple case of no ground, no shock. The best ground is an electrician's galvanized or copper-clad rod or pipe driven 8 feet into the ground. The wire from the charger to the ground rod must be attached securely to the rod, preferably by soldering.

Lead wire: The wire from the charger to the fence should be insulated, especially if the charger is some distance from the fence itself. If the lead is of one metal and the fence wire of another, electrolysis will set up at the point of contact causing oxidation and insulation and render the fence ineffective.

TECHNIQUES: The wire should be stretched on line posts 25 to 40 feet apart, at approximately ⅔ the height of the animals to be kept in the field. If animals of varying sizes are fenced in the same field or in adjoining fields, cattle and hogs, for example, two wires should be used, one at the proper height for each species.

In splicing two sections of wire together the "Western Union" splice, in which one wire is wrapped lengthwise on the other, should be used. A loop splice will rust and form an insulation.

The fence wire itself may be a closed circuit or it may run to a dead end. If the fence is installed right, grounded well, and protected against shorting, one charger can handle miles of fence.

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These combines are the reason nobody makes more self-propelleds than Massey-Ferguson. They prove in the field that nobody makes them better. *These* are the combines to see!

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Photographs by Kazik Pazovski
Text by Charles Straub

Programing for Balance

The Hitch Ranch uses linear programing for greater profits.

"WE HAD ALL the figures we needed, records going back for years, but we just hadn't done the job. We needed this thing to get in focus, to give us a sense of balance." Thus does Lad Hitch point up the reason for a precision program—linear programing as some refer to it—on the 25,000-acre domain of the Hitch Ranch.

The Hitch Ranch lies along the breaks of Cold Water Creek, in Texas County, Oklahoma, right in the center of the Panhandle, that narrow strip once so literally referred to as No Man's Land. Some 17,500 acres of the Hitch spread are in range land. Almost 7,000 acres are highly fertile cropland, of which about 4,800 acres are now irrigated. Then there is a feedlot with a current capacity of about 4,000 head of cattle. So all told, there are here a ranch, a very large farm, and a feedlot—three related but diverse elements.

Lad Hitch is the man who supervises and coordinates these activities. Henry C. Hitch, Jr., is the way he signs all official documents. He is the epitome of the modern farmer-rancher, the businessman in Stetson and boots who has replaced the six-shooter with the slide rule, the mustang with the Cessna. When he talks about his business he sounds like the very personification of Adam Smith's economic man with his exclusive concern for maximizing profits. Lad is in his mid-forties. He is tall. His dark hair is highlighted with touches of grey; his horn-rimmed glasses give him the appearance of being continually in search for those details which make or break an enterprise. He is of the third generation of Hitchs to operate this land. His grandfather, James K. Hitch, settled on Cold Water Creek in 1884. His father, now 76 and still a very active partner in the management of the ranch, has spent his entire life here. Today, ranch headquarters consists of three homes side by side, the father's and mother's, that of Lad and his family, and the one occupied by Lad's sister, Mrs. John Gray and her husband and children. Lad's other sister, Mrs. W. K. Price, Jr., lives with her husband in Orlando, Florida, where the family has citrus groves.

Then there's the programing. This is nothing but the old established practice of

The electronic computers confirm the profit potentials of this 4,000-head feedlot and even suggest its expansion—after all cropland on the ranch has been put to full use.

There is no need to cut-out an animal and drive it to a chute for treatment when the job can be done with an air rifle. Cecil Reedy loads a penicillin injection (right), aims and fires (above). The spent cartridge is recovered after it falls to the ground. In the right-hand column opposite page are the supervising personnel of the ranch. Top to bottom : owner-manager Henry C. Hitch, Jr., general superintendent Kenneth Frantz, feedlot manager Cecil Reedy, crops manager Joe Fitzgerald, and office manager Joe McGrew.

making up budgets relative to the costs and anticipated returns from various farm enterprises or activities, and selecting those which will return the highest total profit. The new wrinkle is that by tabulating all this data and feeding it into electronic computers, many more enterprises can be taken into consideration than was formerly possible. These enterprises can be analyzed in detail and each compared with all the others. All of this, which formerly would have taken months of pencil work, can be done in minutes with the machines.

To put it another way, programing takes the resources available—land, labor, and capital—and considers what crops and livestock they can be used to produce. Then it helps to determine which of the resources must be made use of to get the highest return from all the resources. If capital, for example, is limited, programing will show in which enterprises it can be used best. Programing shows, too, which enterprises will return the greatest profit from each resource; corn, for example, might make the best use of capital; beef cattle might utilize the land the best; and dairying might give the best return from labor. Then precision programing puts all these enterprises together, compares them and shows which combination will give the greatest possible return from the total resources. This balance of resource use can mean the difference between profit and loss.

Opportunity Costs

One of the things programing does which some of the older budgeting work may have neglected, is definitely to take into consideration opportunity costs. Opportunity cost is the income a man gives up from one enterprise when he elects to follow a different one. If he can grow both corn and wheat and decides to go to corn, part of the cost of growing the corn is the income he would have derived from the wheat had he raised a crop of it instead of the corn.

To work up budgets which would take all of these elements into consideration on an operation as far-flung and diverse as the Hitch Ranch would require a tremendous outlay of manpower and time, were it not for the availability of electronic computers to do the figuring.

The ranch had run a cow-calf herd until the spring of 1960 when it was decided to shift to a stocker program in which light calves are bought, run on range or wheat pasture, then finished in the feedlot. The stocker program was instrumental in forcing out the cow herd. The introduction of outside cattle brought disease problems which were a serious handicap in the management of the cows and calves.

The feedlot itself was a relatively new enterprise, set up in recent years to use the feed grains harvested from the farm. It also opened up an opportunity for a new crop enterprise, silage production.

The cropping program included wheat, milo, alfalfa and silage crops, some under dryland conditions, some under irrigation.

There are 19 irrigation wells on the place.

Year-round employees number about 30.

The ranch, the entire setup, that is, had experienced a succession of profitless years during the 1950's. When they started irrigating some years back they had, according to Lad, "tried all sorts of strange crops—grass seed, soybeans, cotton, alfalfa seed—and we lost money on all of them. We were so diversified we were always in a bind. We had too many projects competing for our time and money."

So when Lad found last fall he had a chance to have the whole operation analyzed professionally in a precision program, he went for the idea like an old cowhorse after a stray.

Sherman County, Texas, just to the south of the Hitch place, had called in Doane Agricultural Service of St. Louis to do a survey of the county's agricultural resources and to set up a county agricultural development program. Linear programing was used to develop the recommendations for alternative livestock and cropping programs in this county plan; and after the work was completed the Doane people wanted to try their hand at developing a precision program for a farm or ranch in the area. Lad offered his place. While it was entirely outside Sherman County, even out of the state, its topography, soils and climate were so similar to those in the county an agreement was negotiated and the program was worked out. (A project of this kind done on an individual contract would cost over $2,000; less, of course, on smaller operations. A large part of the cost of putting together a precision program is in developing accurate cost and return data. Many of the figures used in the Hitch program were adapted from the Sherman County survey.)

Fact Collection

First step was to set up a complete list of the resources of the farm and ranch. It was assumed that the Hitchs would neither sell nor lease any of their present land holdings nor would they add to them by buying or renting. This is typical of any piece of precision programing. The land being one of the limiting resources, it must be determined at the outset how much is available. If the amount currently in use is to be reduced or increased, this must be indicated.

The soils were tested and the notation was made in the report that while the Pullman and Richfield soils which make up most of the cropland are of high fertility level, they are low in organic matter and

nitrogen. They have a high pH and are high in potash, but while they have always been high in phosphate this element is being depleted by heavy cropping.

The manpower situation was noted; and schedules were worked out for the distribution of man-hours of the average worker.

For purposes of making up the program, operating capital was set at various levels up to $3,160,000. The various levels of capital, in this as in any similar programing, were determined by the requirements of the successive activities introduced.

The irrigation system, a most important part of the farming operation, was analyzed and found to be efficient and capable of delivering water at a cost of 63 cents per acre-inch (no labor included). The system's present capacity in delivering water is:

April-May	30,235	acre-inches
June	14,870	" "
July	15,365	" "
August	15,365	" "
Sept.-March	73,772	" "

Looking toward the drilling of additional wells, the cost of such installations was estimated at $14,435 for each well, including drilling, casing and pump, and $2,680 for the delivery system, a total of $17,115.

Each new well, it was estimated, would deliver the following maximum amounts:

April-May	1,980	acre-inches
June	990	" "
July	1,023	" "
August	1,023	" "
Sept.-March*	4,950	" "

* (150 days irrigation)

This analysis of irrigation potential was one of the most important parts of the report and led to a drastic change in the cropping system. "Up to last fall we had always had around 500 acres of alfalfa," says Joe Fitzgerald, the Hitchs' crops manager. "But we found it was using too much water, so we plowed up most of it. This year we'll have only about 100 acres. The alfalfa was actually losing us $21.50 an acre. It takes over three times the water milo needs."

The report shows the following water requirements in acre-inches for irrigated grain sorghum and irrigated alfalfa:

	Grain sorghum	Alfalfa
April-May	3.0	17.6
June	3.0	8.8
July	3.0	8.8
August	3.0	8.8
Sept.-March	3.0	10.0
Total	15.0	54.0

Overhead

The overhead costs are of great importance in any piece of precision programing. The Doane accountants broke the Hitch Ranch overhead into three groups: general farm and ranch overhead; general crop overhead (including direct crop overhead); and feedlot overhead. These categories are defined in the report as follows:

"General farm and ranch overhead includes those items which cannot be directly allocated to any division of the farm or ranch activities. It also includes the overhead costs for the ranch (now idle due to recent herd liquidation).

"General crop overhead includes those items which are difficult to prorate on an acre basis and which fairly well hold constant at various sizes of acreage farmed.

"Direct crop overhead includes remaining crop costs which are fixed and aren't materially changed by variations in type of crop produced. These costs vary directly with the number of acres farmed."

Feedlot overhead includes all items directly related to the operation of the feedlot. This includes the manager's salary and house, assistant manager's salary, and the expenses of one automobile. Depreciation, interest and taxes on the feedlot facilities are charged directly in the feedlot budget.

A breakdown of these various costs is shown on pages 54 and 55.

In any precision program the farm operator can place whatever restrictions he desires on the enterprises to be considered, or the size of those to be adopted. If a man has an allergy, physical or psychological, to hogs he says so and they are given no consideration. In their instructions to the Doane planners, the Hitchs drew the line against enterprises involving swine, dairying or vegetables, and a limitation of 1,000 acres was placed on the introduction of any specialty crops. So 11 enterprises other than these were considered under 17 systems of production. These enterprises were:

Wheat—irrigated, dryland-fallow, dryland-stubble; barley—irrigated, dryland-fallow; grain sorghum—irrigated, dryland; soybeans—irrigated; pinto beans—irrigated; castor beans—irrigated; safflower—dryland-fallow; sesame—irrigated; alfalfa—irrigated; forage sorghum—irrigated; cattle—existing feedlot, expanded feedlot, beef cow herd.

The income opportunities in each of these activities was then broken down in detail. To give an idea of the factors covered, five of these analyses are presented on page 120. The figures on irrigated wheat and dryland-fallow wheat make an interesting contrast as

do also those on irrigated grain sorghum and irrigated alfalfa.

While the anticipated profits from irrigated grain sorghum are far from encouraging, Lad is confident he can get much better yields than those used in the analysis. Prices used are in all instances anticipated averages for the next five years.

Besides the bare statistical breakdown the report also contains a narrative comment on each of the enterprises. The following comments, for example, are made on wheat:

"Wheat—has been considered for production under irrigation, dryland-summer fallow and dryland-stubble systems. The dryland production systems yield too low to cover direct crop overhead and are thus eliminated from further consideration.

"The irrigated wheat yield is placed at 40 bushels. Nitrogen fertilization is at 70 pounds and P_2O_5 is applied at the rate of 30 pounds per acre per year.

"This crop makes very efficient use of labor and makes the highest return per dollar of expense of all activities considered."

(*Text continued on page* 121)

ESTIMATED GENERAL FARM OVERHEAD

General manager salary	$7,000	
Annual cost of general manager residence	1,500	
Office manager salary	5,000	
Office secretary salary	3,000	
Office costs (telephone, supplies, rent, etc.)	1,710	
Accountant fees	3,000	
3 company autos, 20,000 mi. ea. @ 10c	6,000	
FICA and Workmen's Compensation	1,000	
Liability insurance	400	
Annual costs on ranch facilities and equipment	4,000	
Sub Total		$32,610
Interest on above	$2,283	
Franchise taxes	346	
Interest on ranch land investment	27,240	
Taxes on ranch land investment	4,540	
Sub Total		$34,409
Grand Total		$67,019

ESTIMATED GENERAL CROP OVERHEAD

(If 3,000 acres or less farmed)

Crops manager's salary	$7.000	
Annual costs of manager's house	1.250	
One auto expense 20,000 mi. @ 10c	2,000	
Interest on these charges	717	
Sub Total		$10,967

(If 3,001 acres or more farmed, add:)

Assistant crops manager's salary	$5,000	
Annual costs of assistant manager's house	1,000	
One auto expense 20,000 mi. @ 10c	2,000	
Interest on these charges	560	
Sub Total		8.560
Grand Total		$19,527

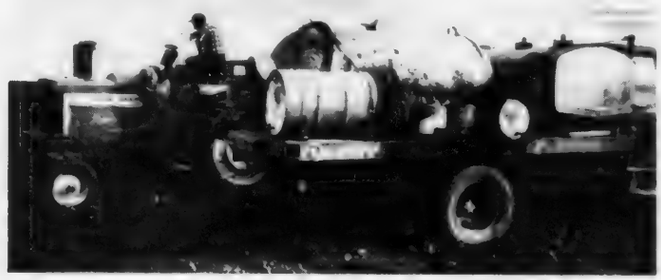
ESTIMATED DIRECT CROP OVERHEAD

Interest on investment in crop land	$14,280
Real estate taxes on crop land	4.760
Machinery depreciation	11,622
Machinery maintenance	9.954
Interest on machinery investment	4.000
Insurance and taxes on machinery	2.668
Two mechanic-maintenance men salaries	8.000
Annual housing cost for mechanic and maintenance men	2.400
One pickup truck, operations and ownership costs	1,900
Land rent on ¼ section	100
	$59,684

$59,684 ÷ 6,347 acres crop land = $9.40 per acre.

SUMMARY

General Farm Overhead ½ × $67,019 =	$33,509 ÷ 6.347 A =	$ 5.28
General Crop Overhead	$19,528 ÷ 6.347 A =	3.08
Direct Crop Overhead	$59,684 ÷ 6,347 A =	9.40
Total Overhead per Acre		$17.76



A longhorn head and the brands in the floor (left) lend a distinct flavor to the lobby of The Hotel Dale, in Guymon, Oklahoma, where the Hitch Ranch maintains its office. Henry Hitch, Sr. (man on the right) here talks with Steve Stevenson, one of his cattle buyers. The OO and the ∫∪ at their feet are two of the Hitch brands. Field work on the ranch is speeded up by use of the mobile service station (top) which carries gasoline, diesel fuel, LP-gas and lubricants. The driver of the truck is also a mechanic who can make any minor adjustments and repairs which may seem necessary. Land leveling (center) is the basic step in preparing the fields for irrigation. Listing (bottom) is the final stage of seedbed preparation.

A. I. in Swine, Today

It's here to stay, though it still may not be available in your area.

By Christopher Kelly

WHAT ARE THE FACTS about the use of artificial insemination for swine?

Anyone who glances through the professional literature will find the articles on the subject liberally sprinkled with indications that there are still a tremendous number of unknowns in the process. Everything from discovering the gilts and sows in heat to the proper volume of semen to be used and the time and method of insemination is still in the category of the moot question.

"We know just enough about it to be dangerous," says Iowa State's Dr. H. L. Self. "It's something like handing a kid a loaded gun." Yet, no one would deny that guns are here to stay. And Self is quick to add that the prospects are better than they were for artificial insemination of dairy cattle 20 years ago, when A. I. was in its infancy in that field. Conception rates are better than they were with cattle in the early stages (about 50 percent on the first service); and the psychological attitude of farmers and breeders is much more receptive. In fact, the danger may be that it is too good and that swine breeders may be expecting a little too much at this time. This is the thought Self had in mind when he made his "loaded gun" remark.

This much is certain though: swine A. I. has progressed beyond the limits of the laboratory and is now a practical technique for on-the-farm use. Field trials have been successfully completed by breeder associations and the State Universities in Michigan, Wisconsin, Iowa and Illinois; Ohio State University cooperating with the Producers Swine Improvement Association. Central Ohio Breeders Association and and Northern Ohio Breeders Association is offering A. I. service to swine breeders in 12 Ohio counties. A northern Illinois group, De Kalb County Swine Producers Association, has started A. I. on a commercial basis. And Eastern Iowa Breeders, a top-notch privately-operated dairy and beef-breeding outfit, has provided the service for farmers around Linn County, Iowa, for more than a year.

Few people in this country have had more experience on the theoretical side of swine A. I. than Dr. Self. Self is a typical Texan of the non-comic book type—tall, blond and determined. He is reserved, yet completely frank, and his statements carry the stamp of confidence which is the mark of the man who has done his homework. For three years he headed up one of this country's biggest research project on swine A. I. at the University of Wisconsin, reported on his work at the International Colloquium on Reproduction and Artificial Insemination of the Pig in Paris in 1959, and is scheduled to participate in the International Congress on Animal Reproduction, Physiology and Artificial Insemination at The Hague this summer. His views deserve the attention of all interested parties.

Ohio's Swine Artificial Insemination Project uses 100 cc. of diluted boar semen for each insemination. The contrast between this and the 1cc. of semen used for the artificial insemination of cattle can be seen above.

His first observation is that swine A. I. is not exactly something new. He points out that research people have been working with the technique since the early 1920's. But until boar-testing work began to make its influence felt there was no real incentive for A. I. Now that the drive is on for better meat-type hogs and the testing stations are available to help discover the sires which will produce them, A. I. has gained new importance. So, for the past five years or more there has been a considerable concentration of effort in the laboratory and in the field.

Self's next observation—and caution—is that swine A. I. is not strictly analogous to, and should not be compared to, the use of A. I. in cattle. Here are just a few of the differences:

- It takes about fifty times as much semen to inseminate a sow as is required to serve a cow.
- Unlike bull semen, boar semen cannot as of now be frozen, or even held for any length of time. Twenty-four hours now seems to be the extreme to which it can be held before use.
- The semen produced in one bull ejaculation can be used to inseminate up to 500 cows. One ejaculation from a boar can serve not more than 30 sows, the average being more like 10 to 12.
- A cow is in heat one day; a sow, three days. ("But," says Self, "I wouldn't give a nickel for the chances of conception when a sow is bred on the third day.")
- Every dairy cow is handled twice a day. The tendency in the hog business, particularly with ever more emphasis on automation, is to give less and less attention to the individual animal. Checking heat in sows and gilts is going to demand work and attention.
- The cow produces but one egg at a time. If she is bred and does not return in heat the presumption is good that the service was successful. Not so with the sow. She produces 15 to 20 eggs at a time. While she may not return in heat after being inseminated, only farrowing will reveal the success of the service. If she comes up with a two or three pig litter something went wrong.

In view of these and other differences Self warns, "Don't reason from bull to boar; or from cow to sow."

Then to insure that, as swine A. I. moves from the laboratory to the farm it will be as free as possible from quackery and from incompetent hands, Self suggests that the best service probably will come from organizations with a reputation to protect, which have the necessary buildings, labs, trained technicians and established routes, and which will offer semen from healthy, performance- and progeny-tested boars.

That is where Eastern Iowa Breeders seems to enter the picture. E.I.B. might also be called a one-man operation, except that

The demand for better meat-type hogs is causing swine breeders to adopt all the latest techniques. Progeny testing helps discover the better boars. Artificial insemination will greatly widen the influence of these superior sires.

this gives scant recognition to the fine teamwork which keeps this outfit right up among the nation's top bull studs. Still, it was Dr. J. W. Pirie who conceived and started the organization almost 20 years ago and who is today sole owner and general manager. The stud has 70 dairy and beef bulls and a large staff of technicians who furnish service to clients throughout Iowa and parts of Missouri and adjacent areas. The organization has also reached out into Colorado and Texas with its beef semen, and has even developed clients in Central and South America. There is no question of its reputation and its technical competence.

Pirie himself is a veterinarian by training, an organizer and innovator by instinct. Tall, slender, with extremely short-cropped greying hair, quick of movement and with the same alert attitude as a juggler with a dozen balls in the air, he is in his late forties.

Fully aware of the fact that some 250,000 farrowings occur annually within a 40-mile radius of his Cedar Rapids headquarters, he has taken his organization into the swine business in a big way. A year ago he assembled a group of good, performance- and progeny-tested Hampshire and Yorkshire boars and went into A.I. Last fall he became convinced that there was a good market for SPF (specific pathogen-free, or disease-free) pigs in the area and in typical Pirie fashion he jumped into the game. He sold the 100-cow dairy herd on the farm he operates near Marion, Iowa, relegated the silage in two towering blue Harvestores to some future use, tore the equipment out of the barn and installed an operating room for the first step in the SPF technique and a semen collection lab for the boars, and built a brand new $50,000 metal building for raising the SPF pigs. Among his future plans is a project for raising SPF boars to be performance tested on the farm, and the best bred of SPF gilts and sows.

One of Pirie's most valuable assets is his his ability to find the right-shaped peg

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Face Flies

"THE FIRST TIME I noticed face flies was a bright, sunshiny day in July of 1958. They were crawling around the cows' eyes and noses. Not just a few—dozens of them. They looked just like houseflies but they sure didn't act like them. I tried to shoo off a couple that had lit on my arm. A housefly would have taken straight off. These flies hardly moved. When I tried to squash them they'd skit sideways, then move right back."

With these words Richard Walker, who farms about 200 acres near Ithaca, New York, told about discovering the pest that had come to plague his 35 Holsteins and animals across the nation. Houseflies seemed so out of place and character on the pasture that Walker got a hunch they might be something new. He scooped some into a jar and took them to Cornell University. Dr. George Matthysse, the insect specialist at Cornell, said Walker's jar held proof that face fly had arrived as a pest of American cattle.

If you go by looks, face fly is no prettier or uglier than the housefly. It is slightly larger and darker, but entomologists have to put a fly under a magnifying glass to be sure which is which. What gives

Face Flies

Face flies, which came to this continent as undesirable European aliens in 1952, pester cattle and horses on pasture. To fight them, last season repellents were wiped on the whole face with a sponge and insecticides were applied in a 75 percent syrup bait painted in an inch-wide strip along the forehead. Non-milking cattle can be self-treated against face fly pests with a triangular cable rubber soaked in five percent DDT or five percent methoxychlor. New this season is a repellent released from a five- or ten-pound aerosol bomb by an electric eye control. The sprayer is mounted framing the barn door or on a gate constructed in the pasture. First attempts are also being made at killing face fly larvae inside cattle droppings with phenothiazine feed additive. Dairymen's surest weapon against face flies today still is the barn. Face flies will persist up to the door, but the heavy shade inside so far has meant certain relief from eye and muzzle irritation.

a face fly away in the laboratory is the area between the eyes. A female face fly sports a stripe wider than that of the female housefly.

On the farm it is a safe guess that if you see flies cluster around the sunny sides of gates and fenceposts and the faces of cattle, you see face flies. The male fly does less harm. He generally hangs around the post and feeds on a few grains of pollen. The female feeds on tears from the eyes of an animal and on mucus from its nose and mouth. Face flies will stick their mouths right into a cow's eye to bring on more tears. Blood is a treat to them, though they don't bite. They take leftover blood from the bites of horseflies and other insects and they flock to any scratch. They are opportunists who take their meals where they can.

"One of the worst examples of this," said Dr. Matthysse, who has spent much time studying the new pest, "was a calf dropped on pasture last summer. Within minutes the wet calf was blackened by thousands of face flies sponging up fluids."

When face flies attack, cattle tend to huddle together and spend their time tossing their heads. Cattlemen feel the loss in the milk tank and in reduced gains. Horsemen also see their animals suffer. Dogs and sheep are molested to a lesser extent.

How many face flies add up to a problem? Some put the number at 10. Others at 50. In heavily-infested areas in the Midwest cattlemen counted over 250 flies per head.

Alfred Eddy, another dairy farmer in the Ithaca, New York, area, figured the 75 to 100 flies per head he counted on a bad summer day caused a slump of 20 percent in milk production. This is a commonly-quoted figure. However, a desperate Indiana farmer estimated his milk production dropped 60 percent. The direct loss from face flies is measured in dollars, not pennies. Indirect loss may be as great. A flareup of pink eye may accompany the arrival of face flies. Alfred Eddy, who manages the 100-cow herd on his family's 400-acre farm in New York, related this experience: "I never knew what pink eye was before face flies started bothering the herd. I had read about pink eye, but I had never seen a case of it. I didn't notice the symptoms till some of our heifers began to go blind. During the last two years five heifers lost an eye and one other went completely blind."

Before 1952 face flies were unknown in the Americas. They previously were a pest to Europeans and people of the Middle East who called them raven flies. The Canadians, the first to see them on this continent, named them black bush flies. They picked up their American name, face flies, when they turned up on New York farms in 1958. They dealt their worst blow to date in 1959 in the Midwest and by last summer they were across the Mississippi. Dairymen in an area extending roughly from southern Wisconsin to Kansas, and as far east as the area between southern Virginia and southeastern Ontario have reported trouble. There is no doubt that face fly is traveling west. California entomologists are bracing themselves for a special blow. Some California cattle have an infectious eye disease spread by a worm. This disease is now a minor problem because the worm lacks a suitable carrier. Entomologists believe face fly will be a likely candidate to transport the worm, because in Russia face flies have been doing this job for years.

Remedies

Face flies avoid shade. New York farmers found that shaded pasture gave cows relief in 1958, but by the next year many face flies persisted even in the shade. So farmers started letting cattle inside the barn for protection. Eddy's herd was plagued by a particularly greedy bunch.

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A Purdue University pinup (left) shows flies the way people like to see them—dead. The male face fly in the center is hard to distinguish from the male housefly on its left and the female housefly on its right. Male face flies are relatively harmless. The bothersome female can be lured to death (below) with baited syrup. A six-inch stroke with a one-inch paintbrush gives a dairy cow safe protection for one or two days.

By Max B. Heppner

NO SUMMER

WHEN YOU FIRST hear that Bill Daugherty of Pennville, Indiana, pastured 25 cows all last summer on one 11-acre timothy pasture and darned little else you find it hard to believe. Daugherty is putting to use some principles of grass growth that allow him to push pasture production through an old obstacle: summer dormancy.

"Really only three steps are involved in getting full-season pasturing," said Daugherty. He ticked each step off on his fingers as he came to it. "One, know how much fertilizer to put on; two, keep cows from tramping on what they should be eating; three—and this is most important—judge how heavy to graze a pasture and how long to rest it before regrazing."

Daugherty explained that the 11-acre timothy meadow had been established for years. The original alfalfa and ladino clover in it had largely disappeared. His plan last year was to use it as his only pasture. This meant he had to divide the field in half so he could alternately graze each half.

"I brought the west section along a week or so earlier by giving it extra nitrogen," he said. "To make sure I got to it early enough, I fertilized when there was still a foot of snow on the ground. I used 75 pounds of actual nitrogen in the form of ammonium nitrate and 150 pounds of 5-20-20.

"The east section needed a little more time to get ready because it had some alfalfa in it worth saving. I gave it only 50 pounds of nitrogen plus the 150 pounds of 5-20-20. Then each time I finished pasturing either half I added another 100 pounds of ammonium nitrate per acre.

"That brought the grass along nicely," Daugherty went on. "To use as much of it as possible I taught the cows that pasture is feed, not bedding. I've found that cattle graze all they want inside an hour. So last year we turned out our cows only three times a day for an hour—at 6 and at 11:30 in the morning and at 5 in the afternoon. When the first cow started to lie down—or even sooner the first few weeks when the grass was just starting—we drove the herd off the pasture. After a while they came in by themselves. The only place they could get water was at the barn, and that reminded them.

"The essential part of getting summer pasture," Daugherty said, emphasizing the word *essential,* "is to time grazing with the stage of growth of the grass. It isn't hard, but you've got to apply yourself to it. As Merle Teel, my professor at Purdue, used to say, 'All you need is intellectual curiosity, a sharp knife, and common-sense'."

Daugherty has all three. If you check with Dr. Teel, Daugherty's agronomy teacher, he will confirm his former student's curiosity and commonsense. "He's curious," Dr. Teel will say. The professor doesn't mean odd, he means inquisitive. "Bill Daugherty,"

Orchard grass (left), a non-jointing grass, has its growing point underground. Fleshy sheaths, one inside the other, grow from it. Grazing cattle can't reach the growing point. But to have good summer pasture (below) you should leave some leaf blades in orchard grass stubble. A jointing grass like brome (right) develops a growing point just above the shortest joint in the stem. When the shoot is young, it will stop growing if the growing point is grazed off.

DORMANCY

he will explain, "seldom made outstanding grades because he couldn't bring himself merely to parrot what some instructor said in class. Bill had to go and find things out for himself. Once he gets facts he knows are right, he figures out a way to apply them. That is commonsense."

Checking with a Knife

"You need the sharp knife to check on the stage of grass growth," Daugherty explained when asked how this tool fitted with curiosity and commonsense in pasture management. "When the cows first start grazing timothy in the spring, I cut off a few average shoots at the ground and split them lengthwise. Then I pull the split shoot across my finger along the cut until the young seedhead pops out of it. When the seedhead is about 2 to 3 inches off the ground and cattle are grazing close to it, I take them off the pasture. If you let them graze off the seedhead, that shoot of timothy will stop growing. If you only graze above the seedhead, the shoot will provide more pasture in a week or two."

Daugherty continued probing with his penknife all last season, but he wasn't always looking for the seedhead. When he checked the pasture the second time around to see if it was safe to regraze, he looked for tiller buds at the base of the shoots. These buds produce the second crop of timothy shoots, and Daugherty knows that when the new shoots barely break ground they are ready to grow quickly.

A few weeks later when he pastured the new shoots (the third grazing period), he again split blades to look for seedheads. Before the fourth pasture period he was back checking for new tillers. When he found them he put every cow he had, including dry stock and heifers, on the timothy so that once again the grass would concentrate its growth on the next generation of shoots. The timothy regrew with the least effort and Daugherty avoided summer dormancy.

Usually, he gets a third crop of shoots providing a fifth and sixth grazing. After six grazings he lets a pasture like last year's timothy grow undisturbed till winter freeze-

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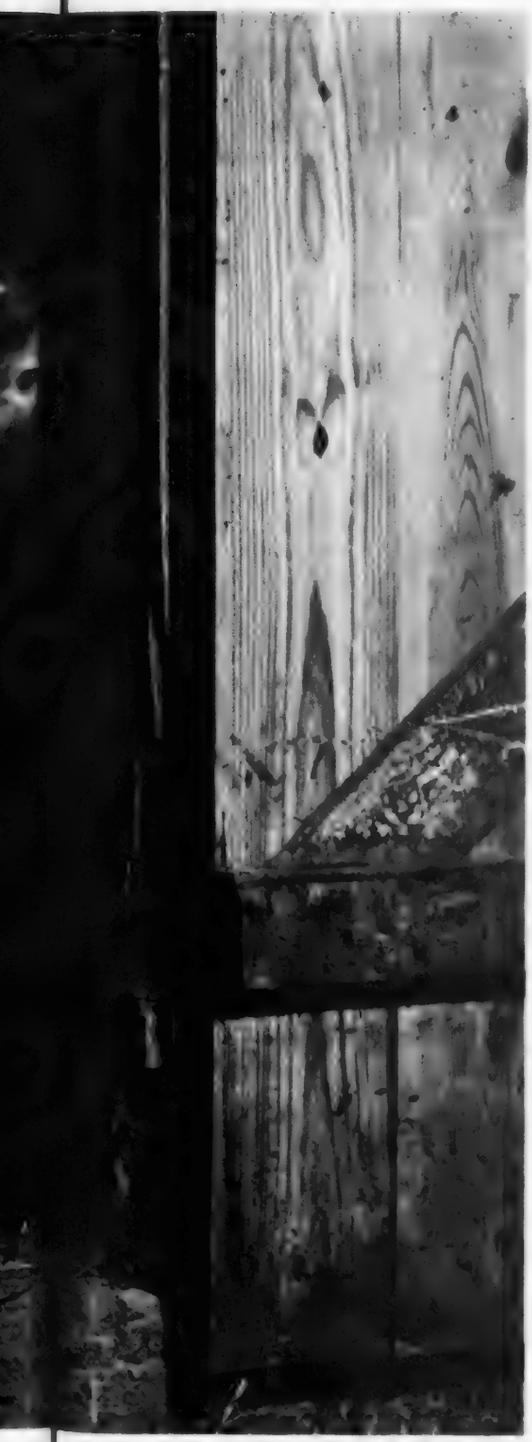
NO SUMMER DORMANCY

Continuous grass growth through the summer is possible with proper fertility and a method of using available soil moisture when and where it will do the most good. This method is based on the typical growth habits of the species of grass in the pasture. Basically there are two types of grass. One type, jointing grass, raises a growth zone (growing point) above the ground, where it is vulnerable to grazing. Timothy and brome are typical of jointing grass. They tend to go dormant when growing points are grazed off too early. The height for safe grazing is determined by splitting shoots to locate the growing point. At a later stage the growing point *must* be grazed off to give buds in the root crown a chance to develop. This stage is reached when seedheads emerge from the shoots and crown buds develop into sprouts that break ground. The growing point of non-jointing grasses typically stays at ground level or below. Orchard grass and bluegrass are examples. To protect each growing point, frequent cutting or grazing is necessary, but enough leaf blades must be left in the stubble to keep the growing point supplied with adequate moisture to prevent drying out. Otherwise the plant will die.

The Rise of the Heifer

r Specialist

By Frank Klein



A heifer specialist can bring out the full production potential of promising calves like these. He can devote enough time and good feed, unlike the dairyman trying for top milk production.

RAISING DAIRY replacements for others is a full-fledged business for a growing number of dairymen. This is particularly true in California where these farmers carry the apt name of heifer specialist. Custom heifer raising in New York is just beginning. Still, a pioneer in this new field, John H. Benham, Jr., of Canandaigua, is selling off his milking herd as he approaches his goal of a 400-herd heifer business.

Heifer specialists offer two types of deals. In one, the dairyman merely contracts to have the specialist raise home-produced calves for a flat fee. Heifers may go into contractual care at the age of two weeks or younger, or after weaning at about four to six months. It is also possible to split the calf-raising job among the extremely refined specialists. Bill Judge of Orlando, Florida, has one contract with a neighbor to raise his calves to weaning. A second specialist in Tennessee carries the weanlings till they're ready to freshen.

A second arrangement used by heifer specialists is to buy calves, raise them, and resell them as springers, often to the original owner. The promise to resell may be informal or in the form of a legally binding option-to-purchase contract. Raising calves owned by another and buying calves for later resale aren't mutually exclusive arrangements. Many specialists use both.

Developing the Specialty

John Benham's farm in New York typifies the chief advantage of the heifer specialty —plenty of good-quality forage. His customers benefit by saving their best forage for their milking herds. This relationship had much to do with getting Benham started in the business.

Last year he had just added 200 leased acres to the 200 he was already farming. His dairy—the farm's feed converter—was small and outmoded. Benham, a short, shrewd farmer in his forties, wondered whether he should make a heavy investment in milking facilities. He felt that this would be signing the rest of his life over to his business. Raising heifers on contract seemed an attractive alternative.

Other peculiarities of the Benham farm fit in well with the specialty. The sheds and barns are grouped in four locations stretching three miles apart. All of them could be converted to house calves at a small expense. Benham felt that spotting calves at each lot would allow him to grow, store, and feed forages near the fields where they were grown, eliminating a lot of hauling. So he started looking for a client.

He found what he was looking for in Harold and Francis Miller. Their 200-acre dairy farm at Penn Yan, New York, has a chronic feed shortage. Harold Miller, who eases into the role of spokesman more comfortably than his brother, explained this situation last spring. "We increased the milking herd to 54 milkers," he said. "Even before we started expanding we bought forty or fifty tons of hay a year, besides a good deal of the concentrates. We were feeding the best hay to the cows, and the heifers got the leftovers. Some of them were much too light when they freshened."

"We spent too much time with the heifers," Francis Miller added. "I'd spend an hour a day just feeding calves."

"We didn't have the space to keep the heifers either," Harold continued. "The calf pens took up loafing area for the cows. We were up against it and we think John Benham's raising the heifers for us is a great solution. We pay him over $240 each month to keep 23 of our calves, which still seems

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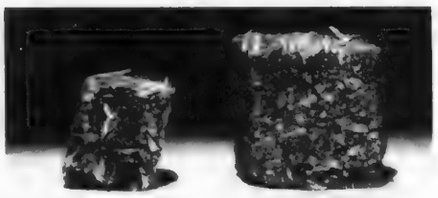
The Rise of the Heifer Specialist

Farmers are finding heifer raising a profitable enterprise. Two arrangements are being used: (1) raising heifers on contract for the dairyman, and (2) buying heifer calves, raising them, breeding them, and selling them as springers. Charges under a contract vary. One heifer specialist charges 30 cents per pound of gain between four months and delivery (he will not take calves before weaning under his contract). Another charges $7 per month as a flat fee, and a third charges feed costs plus six percent of these costs for management. Specialists who buy the calf outright usually give the seller the right to first bid on the springer when she is ready for sale.

FIELD WAFERING



The problems and successes of two new machines.

By John MacCallum

LIVESTOCK ENJOY wafers providing they aren't rock hard. Cattle, sheep, hogs, even burros treat the bite-size wafers like candy. No one seems to know exactly why. Because of this acceptability, and because a cow can eat more pounds of hay an hour if it is formed into relatively compact wafers, there has been a flush of claims for the yields of beef and milk when wafers are fed. Some of them are exaggerated. But better results definitely are common. Two manufacturers have produced working field machines to capitalize on the advantages of wafers, many others have experimental models. None are on unrestricted sale this year.

Wafers are easier to handle than bales or loose hay. They don't have to be lifted, like bales; they can be stored in bins, like ear corn. But there are some problems of handling so far unsolved, and in many cases ignored. Eager journalists and overenthusiastic salesmen have glossed over the problems of wafer handling with bland statements like: "They've eliminated hardware disease." "They are a natural for push-button feeding." "There are no 'seconds,' all feed is uniform." "Store in one quarter the space of baled hay." "Within ten years the bale will be a relic of the past, almost forgotten."

The Lundell waferer (below) picks up cured hay from a specially prepared windrow, and produces a wafer about two by three inches. The Lundell wafer is large compared to the cube (above) from the Cal-Cube.

The first four statements are exaggerations. The last is a poor bet.

Definitions are in order. The differences between a hay pellet, wafer and a bale are largely matters of density. To avoid confusion, let's call a pellet a small package, less than an inch long or ¾ inch in diameter. It is dense, weighing over 35 pounds per cubic foot. The wafer is from ¾ inch to six inches in diameter, usually less than six inches long, and weighs 20 to 35 pounds per cubic foot. We'll define a bale as a hay package requiring a tie, weighing usually 10 to 12 pounds per cubic foot, though some compact bales may be 25 pounds per cubic foot.

The general difference between a pellet and a wafer is that the pellet is denser, usually bonded with additives such as concentrates or molasses or steam (added as the pellet is made), and the hay in a pellet is usually ground. These three requirements have made pelleting largely a stationary job, and limited field pelleting machines to two or three experimental models.

Not so with field wafering. Various machines and handling techniques have been tested by major equipment companies, state universities, and USDA researchers. But in spite of the fact that one company began research before World War II, and a dozen have been pressing in earnest since the early 1950's, there still is no machine of any kind freely on sale to any farmer. As we go to press, we estimate there are fewer than 100 hay-wafering machines in existence, and one company has more than half of those.

That company, of course, is the Lundell Manufacturing Company, a dark horse in the wafer race, which came out with a working field waferer and is now offering it to selected farmers on a semi-experimental basis. The company says production this year may reach a thousand, and that it will be freely sold in 1962. However, it's only fair to recall that in 1960 this was claimed for 1961.

The other machine, called "Cal-Cube," is made by a group of farmers and engineers in an unassuming workshop in Woodland, California. It is not yet for sale.

Stiff Competition

The slow development has been due to two barriers, one mechanical, the other economic. It is hard to make a wafer at all and, once made, the wafer has to compete with the well-established bale. And when it comes to dollars, the much maligned bale has been putting up quite a fight.

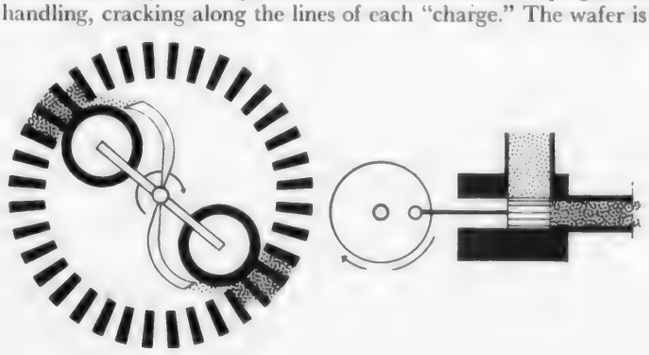
The hay in a bale is compressed—and held tight by wire or twine. When the tie is broken, the bale loosens up again. It still has "springback." The wafer doesn't. The ideal wafer should remain the same no matter what its treatment after leaving the machine. At a certain point in compressing forage it becomes a wafer, a semi-hard nut of small size, without the bale's tendency to expand.

E. C. Carlson, soft-spoken divisional chief engineer at International Harvester, said, "Pressures required to wafer hay range from 2,000 to 8,000 pounds per square inch; 4,000 represents some form of compromise. Baling pressures usually range around 40 pounds per square inch."

Carlson, in his office in the new International Harvester Corporation engineering center just outside of Chicago, continued, "It appears that power in the range of 20 to 30 horsepower per ton per hour is required to produce wafers in the field. This means a six-ton machine needs a 120 to 180-horsepower engine. A machine capable of handling this quantity of power cannot easily be miniaturized to compete in weight and size with a baler."

The hay wafer is made by forcing cured forage through a die—like a sausage machine. (As Dale Hull, Iowa State extension engineer said, "Salami is a wafer, although pretty high in moisture content.") The die is a metal block, with round or square holes through which the hay is forced. The resistance of the hay to passing through the die builds up the pressure against the ramming device, and the rate of feed and the length of the die determine how long the wafer remains in the die. This is called the "dwell time" and is important in the formation of a wafer. A combination of long dwell time and low pressure acts somewhat the same as short dwell time and high pressure. At least up to a point.

The die is like the chamber in a baler, but the wafers emerge from the die in a continuous length. They are broken up into short pieces, by bending the long plug of hay with a curved guide, or a deflecting plate. In practice, wafers tend to break up again in handling, cracking along the lines of each "charge." The wafer is



The Lundell machine uses the roller principle, squeezing hay through a die containing many holes (left diagram). The Cal-Cube waferer (above) is a piston machine, acting like a tiny baler (right diagram). Wafers in storage stack like ear corn, they don't flow like a grain. They'll form a cliff of wafers (top) in a storage barn, which complicates handling. But you can get far more hay in a barn as wafers than as bales, and the work is not as backbreaking as lugging around a bale.

The Lundell field flail chopper (above) is an integral part of their wafering system. It lacerates the hay and windrows it to dry before wafering. The spout swings to any of three positions, so three five-foot cuts may be put into one fluffy windrow. The homogenized hay dries very fast.

built up of charges, or layers, of hay, each charge representing one slug of hay added to the end of the wafer in the die. As the ramming mechanism makes another cycle, one charge is added. These charges correspond to the familiar slices in a bale. Pellets, made of ground material using a sticky bonding agent, seldom show these layers, and certainly stationary waferers have avoided them, using finely chopped hay and extremely high pressures, or a continuous pressure device like an auger.

As yet, good wafers can't be made from every crop. A certain percentage of legumes seems essential. Most wafers have been mainly alfalfa, and pure grass wafers offer problems.

There are three general methods of compressing hay into a wafer, using a piston, roller or auger. All have been tried and all have produced wafers. The piston type acts very much like a baler, with a piston cramming hay through the hole in a die, usually the same area as the piston. The auger type works like a hamburger machine, or the kitchen meat grinder. An auger, usually tapering to a point, forces hay through the dies. In any machine, the dies wear out sooner or later, varying with wear, temperatures and type of die. Die life may vary from 2,000 tons to 10,000 tons, or more, depending on conditions.

The roller type of wafering device may have one or two roller action. With a single roller, it acts like a steamroller passing over a grating. The roller forces hay through the grating or die. With two rollers, it acts like a wringer on a washing machine. The hay is compressed between the rollers. All these methods, and often combinations of them, have been tested.

Only two machines to date are not classed as "experimental," each from a small company. However, each machine still has minor problems to cope with before it can be labelled "finished." They use completely different techniques, and both do a creditable job of making wafers. The machines are made by Lundell and Vaughan-Johnson. The differences between these machines, and the experiences of farmers who have fed their wafers is the most useful information now available to the farmer on the future of wafers.

The Lundell Manufacturing Company of Cherokee, Iowa, has a compact, relatively cheap wafering machine which produces a wafer of rectangular cross section, about 2½ inches by 2¼ inches, varying in length from two to five inches. The machine uses the

single-roller principle (although it has two rollers) running inside a circular die forcing the hay out all the way around the circle of 25 chambers in the die. Many pellet mills work in the same general way. The two rollers are fed by an auger with twin flights. (That is, two sets of flighting, round the same shaft.) Each flight ends in a flat deflector, which feeds the hay directly in front of the advancing pressure rollers which, in turn, squeeze the hay out through the wafering chambers. From the chambers the wafers drop to a rubber-flight elevator, delivering to a wagon trailed behind.

The Lundell machine has changed considerably since it was first demonstrated more than three years ago, though the system remains the same. The latest model is a tractor-drawn machine little bigger than a large baler, with a flail-type pickup which throws the hay from a windrow to the auger which feeds the rollers. It is a very simple machine, weighing around 4,600 pounds, powered by a 125-horsepower gasoline engine.

This newest waferer was working in Yuma, Arizona, last February. The machine was to be run on the Ken Easterday ranch just out of town, past the Yuma Territorial federal prison. The ranch is on "The Island," rich farmland, easily irrigated from wells, which is land disputed by Arizona and California (a course change of the Colorado River, the border between the states, "switched" the statehood of the patch of land.)

Vernon Lundell, the manufacturer, and Ken Easterday, the rancher, are as unlike as thunder and lightning. Lundell is a medium-sized fireball, with never-ending enthusiasm for the wafering machine. He boosts it and explains it unendingly, sometimes repetitively. Easterday is a tall, handsome, lean cattleman, who looks strange without his vast rancher's hat.

The crop to be wafered was a first cutting of alfalfa. It was light, less than 24 inches high, and well before bloom. It made extremely high quality hay, with a yield of about ⅔ to ¾ of a ton to the acre. It was being cut earlier than usual, even for this area.

Lundell went into the field shortly after lunch and examined the windrows, pronouncing them ready for wafering. The moisture content was under 20 percent. They had been cut between three and four days earlier. This in itself is an achievement and quite a testament to the flail cutter, as long hay in a neighboring field had been cut seven days and was still not dry enough to wafer (or bale). Lundell's flail cutter is an integral part of the wafering process. He insists hay for wafering in his machine be flail cut, windrowed directly after cutting, and given a half turn by a single-wheel rotary hay rake. The waferer picks up the hay from this windrow, using another flail-type pickup.

"You have to do it this way," said Lundell, picking up the lacerated hay from the windrow. "This is 'homogenized hay,' uniform all down the line. People have said it'll never work, that the hay is processed too much. We process it more than anyone else, we homogenize it, we knit the leaves and the stems. A wafering machine won't forgive you for a big slug of hay like a baler will."

The windrow is unlike any we're used to. The whole plant is lacerated, far more than by a crimping or crushing hay conditioner. Lundell's flail cutter now has a five-foot cut, although a three-and-a-half-foot extension is planned. The cutter has a 12-inch downspout, swinging from the rear like a vast elephant's trunk. This can spew the lacerated hay in three different positions, right, left, or center, so three five-foot cuts can be put in one windrow. The windrow sits up, fluffy and pervious, more like green cotton than hay. According to Iowa State University tests, it not only dries faster than any other method of cutting hay, but sheds rain better. It is a strange-looking product, however, and there'll no doubt be some resistance to it from farmers who are used to seeing a crop that looks much the same after it is cut as before.

Moisture Limits

There aren't many experts on wafering yet, but those few seem to agree the hay has to contain from 10 to 25 percent water or it can't be wafered. Lundell prefers around 15 percent. His method is to let the hay get a little too dry and add water before wafering. His machine uses eight nozzles, each adding 10 gallons per hour, only when the hay is in the machine. Each is controlled by an electrical switch near the driver, so anything from 10, 20, 30 up to 80 gallons per hour is added. As Easterday said, "You get to know the places in a field where hay dries quickly. Then all you do is flip a switch. The same's true of the hay drying as you work." This water is supplied from a 240-gallon tank, built into the chassis

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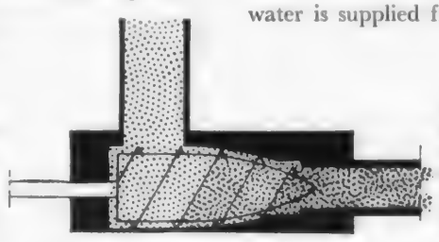
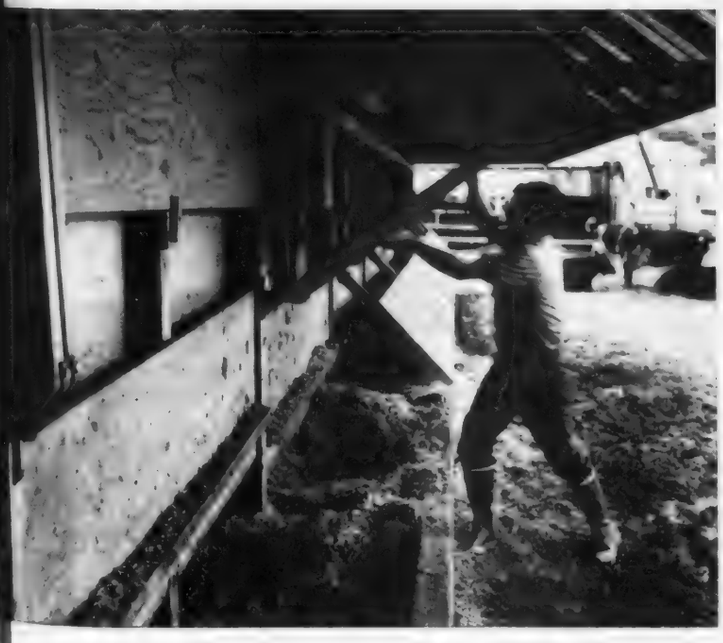


The diagram shows the auger type of waferer, tested experimentally, not in production, although the Cal-Cube machine uses an auger as well as a piston. The two types of feeding are (below) a self-feeding barn (left) and a mechanical distributor (right). Slides on the self-feeder control the flow of wafers from the barn, doors cover the bunk to cut off feeding entirely. Fines may be a problem when the cattle can always reach for new wafers. The mechanical feeder fills the bunk in ten minutes from a nearby barn. It's a homemade cable feeder, running on a truck tire. Some breakage of wafers occurs.



Ding Dong Daddies from Dumas

Solve Local Problems with Local Talent.

By Charles R. Koch

WHAT DO YOU DO when your local grain elevator has only about two percent of the capacity needed to handle the production of local growers?

Or, say your town suddenly becomes the mecca for a great influx of transients, salesmen, construction workers, engineers and so on, who are in need of accommodations, and there is nowhere to put them up. What do you do then?

Then a lot of these people begin to settle down. They want to build their own homes in your community. But they find, of course, this requires some financing. Where are they going to get the funds?

Then, let's say you are in the center of a big grain and livestock-producing area. Thousands of stockers graze your wheat pastures every winter. Comes spring, they are loaded up and trucked to out-of-state feedlots; and right up the highway behind them go the grain trucks hauling your grain to go into those cattle. Pretty silly, isn't it? But what are you going to do about it?

The tendency in some quarters would be to go screaming to Washington for help. Not so with the Ding-Dong Daddies of Dumas. They met and solved each of these problems strictly with home talent. While probably every male resident of Dumas fancies himself a Ding-Donger, their peals ring out in varying degrees. Some of those most responsible for the bell ringing are men like Herb Clark, Buck Wells, Jesse Cooper, county agent Martin Gossett, and those who have teamed up with them to put across the projects which helped in the solution of their community problems.

Latest project of the Ding-Dong Daddies is the feedlot. In the scaleroom (above, left to right) are A. J. Harris and S. L. Makeig, stockholders and feeders; Howard Diedrichsen, manager; Herbert Clark, president; Gaston Wells, director; Bob Owen, yardman; and Joe Schuman, director. Jesse Cooper (above, left) is a director of the local hotel corporation; Gaston Wells (above, right) is president of the savings association, vice president of the Dumas Co-op. A cow (opposite page) "enjoys" a brucellosis test, one of the many extra services for which the facilities of the feedlot are available to neighboring farmers and ranchers.

Dumas is a town which gained fame long before it deserved it. Back in the days (a good 40 years ago) when everybody was singing

"I'm a Ding-Dong Daddy
from Dumas
You ought'a see me do
my stuff!"

the subject town was an unknown and absolutely unimportant crossroads in the northcentral part of the Texas Panhandle—that region where the traveler could look farther and see less than anywhere else in the country. The only possible distinction that could have been accorded Dumas in those days was the fact that it was the seat of government for Moore County, a political subdivision named in honor of that intrepid commander of the Texas Navy, Commodore Edwin Ward Moore.

But forty years have seen some changes and today Dumas (population 11,004) is an important and prosperous town. The latest edition of the *Texas Almanac*—a book, as might be expected, almost as large as the *World Almanac*—calls it the "center of one of the greatest natural gas-producing areas in the world . . . also the center of a great wheat and grain sorghum area."

The statistics show there are 245,000 acres under cultivation in the county. Of these acres about half are in wheat, 50,000 are in milo and about 3,500 are in ensilage crops. Irrigation hit the county in 1952 and

there are now about 270 wells providing water for 50,000 acres of the wheat, 40,000 acres of the milo. The county produces 2 to 2½ million bushels of wheat per year and some 100,000 tons of milo.

The livestock population is quite fluid because of the seasonal utilization of the wheat pastures. There are presently about 4,500 head of cows in the county and, as of late last winter, there were some 20 to 25 thousand stockers grazing the wheat pastures. These cattle had moved in mostly from Alabama, Mississippi, Louisiana, south Texas and New Mexico.

There are no Grade A dairies in the county, only three local bands of sheep and only three commercial hog operations. Martin Gossett, the tall, omniscient county agent, is convinced there are great possibilities in swine in the area. "Hogs do well on milo," he says, "and if the boys study their lessons they'll make money with them."

It was those two figures—100,000 tons of milo and 20,000 or more of the stockers, both of which were moving right out of the county in the raw state—that set the Daddies to figuring whether they couldn't bring the two together. Thus was born Moore County Feeders, Inc., with its modern lot for 5,000 head of cattle.

Stocky, freckled-faced Herbert Clark, a resident of Dumas, who operates a large farm and ranch to the southwest of town, is president of the corporation. Herb is retiring to the point where he almost seems reluctant to admit to pulling on his own boots; but a little investigation soon shows that he can well afford to let his record speak for itself. He has been active in just about every project connected with civic, agricultural or business betterment in Moore County. He was born in Dumas not too many years before "The Ding-Dong Daddies" became a hit and Moore County has always been his home. Here is his story of how the feedlot was organized and built:

"For years we had seen our cattle and milo rolling up the line to the Colorado feedlots," he begins. "Last year we finally decided it was time to do something about it. Martin Gossett got a bunch of us together, and in April about 30 of us climbed into a bus and made a tour of some of the feedlots down in the south plains. We saw some that were well-planned and some where mistakes had been made, but what we saw convinced us there was no reason why we couldn't build a moderate-sized lot here, where we could create a market for our milo and silage and help stabilize our economy by keeping a lot of these stockers right in the county while they were growing into beef. So we organized Moore County Feeders, Inc.

"We didn't want to go over our heads in building the feedlot so we figured about 5,000 head was enough capacity to start with. With that kind of capacity we could run 12,000 to 15,000 head a year through the lot. We were thinking in terms of an investment of $80,000 to $90,000 but we finally wound up with right around $135,000 tied up in the project.

"One of our minor problems was to find a spot far enough from town and on the right side of town where the lot wouldn't be a source of unpleasant odors for the residential sections and where we wouldn't be running the risk of being surrounded by subdivisions within a few years. S. L. Makeig gave us a 99-year lease on 40 acres on the west side of Route 287, a few miles north of town, and we were ready to start building. Our lease contains an option to buy and we have another option on adjacent land in case we decide to expand."

The corporation issued stock of $1 par value and soon disposed of $74,500 worth of stock in blocks of no less than 500 shares. Some 55 stockholders comprise the ownership. Herb Clark was elected president: Gaston Wells, vice president; Joe Schuman, secretary; Dr. Floyd Blackburn, treasurer, and R. O. McMurray, assistant secretary. All the officers are farmers or ranchers except Blackburn who is a veterinarian. All of this took place within a few weeks after their tour of the south plains feedlots.

"But," continues Herb, "we knew we had to get an expert to run this thing. None of us had ever had much experience with a feedlot and none of us had either the time or inclination to take it over, even if we had the experience.

"Martin Gossett had met a cattle buyer by the name of George Diedrichsen on some of his trips down here and Martin suggested that maybe George might be interested in taking on our feedlot. George has been in the cattle business most of his life and was operating a feedlot of his own up in eastern Nebraska with his son Howard. So we got hold of George and asked him if he'd be interested in running this lot."

The outcome of the negotiations with the Diedrichsens was that the latter leased the lot from Moore County Feeders for 10 years for a rental of one percent per month of the original investment. The corporation is to take care of all ordinary upkeep and wear and tear, and the Diedrichsens are to pay one percent per month on any improvement or additions. In turn, the Diedrichsens agree to feed any and all cattle consigned to the lot by the stockhold-

The locally conceived, built, and owned Dumas projects are shown here. They are: the feedlot (right); the North Plains Savings and Loan (shown below); the grain elevator (opposite page), which has grown from the tiny ironclad structure shown right to the big silos with 1,750,000-bushel capacity; and the four-story Sneed hotel (far right).

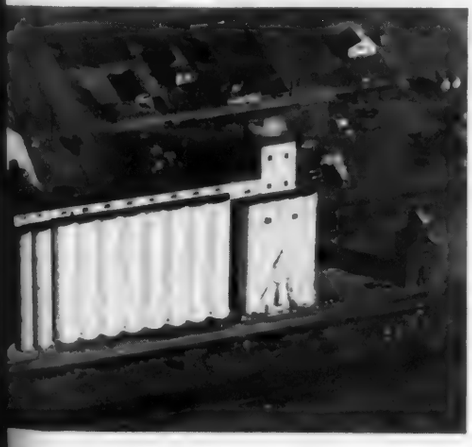
ers and others, for which service they charge a yardage fee of seven cents per head per day. Feed is furnished at cost plus a charge of 15 cents per hundred for rolling the milo. The owner may furnish his own milo and hay if he wishes, no charge being made for delivering it to the bunks other than the charge for rolling.

As soon as the negotiations were completed George Diedrichsen took charge of the design and construction of the facilities. The corporation borrowed an additional $45,000 from the First State Bank of Dumas and Diedrichsen paid his first year's rent in advance to furnish the funds to complete the work. Building started in June last year and by November 1, the yard was ready to receive cattle.

The facilities consist of 32 feeding pens varying in capacity from 75 to 350 head each, and 12 working pens together with alleys, chutes and squeeze for sorting, branding, vaccinating, dehorning, treatment of sick cattle, and so on.

There are five trench silos with a total capacity of more than 10,000 tons of silage adjacent to the lots. Much land close to the feedlot which had formerly grown grain was switched to the production of forage sorghum last year when the Diedrichsens announced they would be in the market for silage and would pay $6 per ton delivered, $4 a ton if they had to handle the cutting and hauling themselves.

The mill is equipped with the very latest in grain and silage handling equipment, including a roller mill with steaming facilities. There are nine overhead storage bins



with 240-ton capacity. Included in the office space are a large scale room with a cattle scale on one side, the grain and feed scale on the other, three individual offices, a veterinary supply room, and a washroom.

Young Howard Diedrichsen, a University of Nebraska grad, presides over the feeding operations and tailors the rations to fit the cattle. His results on daily gains and costs per pound have been keeping the customers quite satisfied.

Besides feeding, the feedlot offers a number of other services to the cattlemen of the county. The yard facilities and help are available for weighing, dehorning, castrating, branding, vaccinating, testing, or any other job requiring scales, alleys and chutes. It is not unusual to see cowboys driving a herd of cattle along the side of the highway heading for the yard for one of these services. Charges run from 10 cents per head for weighing to 35 cents for castrating.

"We worked 1,500 head going on wheat pastures last fall when we were just getting started," Howard Diedrichsen says. "We may handle 10,000 this fall."

To encourage the fullest possible use of the feedlot the First State Bank of Dumas offers local feeders a very attractive loan. Responsible individuals can finance up to 70 percent of the cost of the cattle plus the entire feed bill. Interest is seven percent.

Dumas Co-op

Obviously, the feedlot is severely restricted in its grain storage capacity. But here is where another of the community services enters the picture. One of the first of the facilities on which the Ding-Dong Daddies got together was the Dumas Co-op, their big grain elevator with its present capacity of some 1,750,000 bushels. Gaston Wells, ("Buck" to everyone in Moore County) who farms some 1,500 acres to the northeast of Dumas, is vice president and a director of the co-op. Wells lives in Dumas, but does his own farming, driving out to the farm early in the morning. There he puts in a full day, unless matters at the elevator, the feedlot, or one of his numerous other interests demand his attention. In appearance there is no mistaking the fact that this straight figure in the grey coveralls and battered hat is a master farmer. When he speaks, his precise, direct statements stamp him as a natural executive. He is well qualified to tell of the development of the co-op.

"We organized in 1947," he says. "At that time there was a little, old, inadequate 27,000-bushel elevator here. The combines hit this country about that time and simply swamped that little elevator. The fellows who owned the place couldn't see themselves financing a bigger setup, so they said they would sell out if the farmers here in the county would form a co-op.

"A bunch of us got together and sold stock, got a charter from the state, and arranged a warehouse bond and we were in business. The first year we operated with the old elevator; but we had sold the stock on the promise of four bushels of storage space for every dollar a grower invested in the co-op. So in '48 we began the first of five building programs and built 300,000 bushels additional capacity. Because of constant expansion and improvements we've never since been out of debt.

"To help finance this continuing expansion we have from time to time gone to the Houston Bank for Cooperatives and borrowed on 20-year notes.

"The co-op has proven very successful and along with our neighboring privately-

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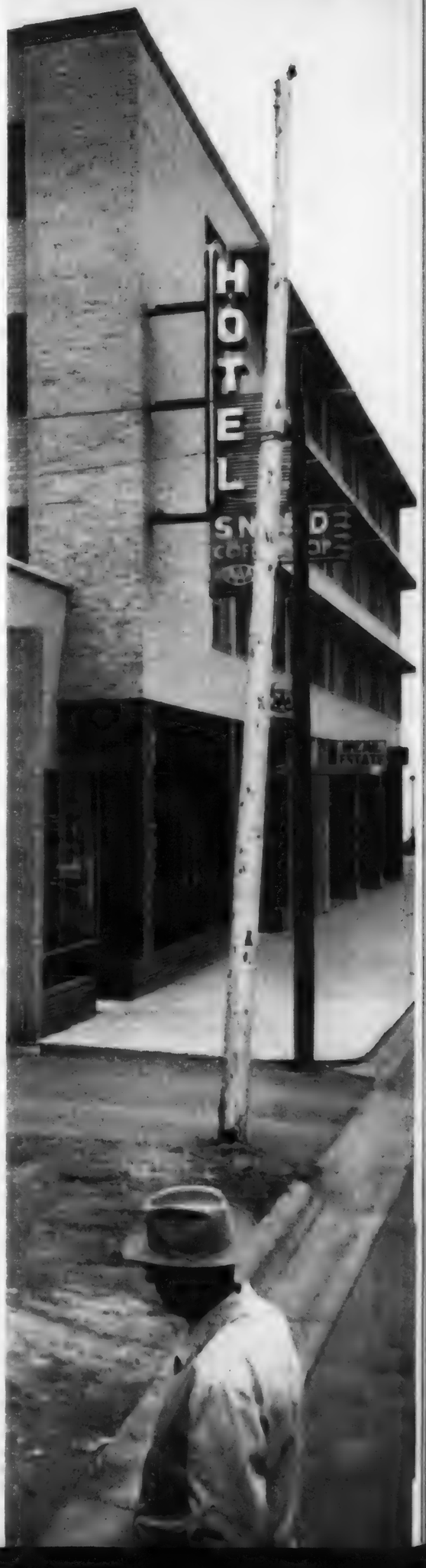


Sea Farming

A seagoing hay wagon harvests kelp for stock feed and industry.

By Joseph Smith

IN 1926, Philip R. Park converted an old Sacramento River barge into a gargantuan seagoing mowing machine, one of the oddest crafts ever to sail the seven seas, and began one of our most interesting "farming" industries.

This ship, the "C. L. Arques," is 78 feet long with a 28-foot beam and an open hold. It operates out of San Pedro, California. It has averaged three trips per week since its conversion, harvesting 125 tons of giant kelp per trip off the coast of California.

These plants from the sea are not only helping farmers raise better livestock, but the impressive list of products from seaweed makes them seem essential to our way of life.

Philip Park was one of the first men to study kelp as a feed for livestock and to develop commercial methods for harvesting and processing. Early in the 1920's he visited the British Isles, cradle of the modern world's livestock breeds, and observed cattle pass up lush grasses along the coast and go to the beaches to eat seaweed. Here he got the idea that there must be a rich nutrient in kelp. His tests found 32 minerals including iodine, potassium and phosphorus, plus substantial amounts of essential elements and vitamins A, B, C, and D. He also found alginic acid, a colloidal substance that serves as a bulk producer in livestock meal preparations. Sold in a white powder or paste form, this material has gained wide use in the baking, ice cream, cosmetic, pharmaceutical and industrial fields.

Today, three companies, including Philip R. Park, Inc., are harvesting kelp from the Pacific coast ports of San Pedro, San Diego and Hueneme. They divert the various extractions to many industrial uses as well as to feed supplements and fertilizers.

Harvesting

"Imagine yourself a farmer starting out for the next day's harvest at 11 p.m. You buck winds and waves, even a touch of seasickness, and travel all night with snatches of sleep until about daybreak," said tall Captain Norman Hodge, a salt water farmer who has been in command of the C. L. Arques for six years.

"We pilot the ship to a forage field that we didn't have to plant, plow or cultivate. When we reach the kelp beds, I line up the ship going the way the kelp lies with the wind and tide, alert the crew, lower the cutter bar, and the harvest is on."

It is a rule of the California Fish and Game Department that giant kelp, (Macrocystis pyifera) one of the world's 17,000 seaweed species, cannot be cut deeper than four feet below the surface. Yet the floating ends of the kelp caused by wind and tide yield a 10-to-20 foot cut length. The kelp plants grow up 40 to 60 feet from the bottom of the ocean.

"Kelp beds don't move about, but will disappear in high currents and rough water as the movement draws the seaweed under," Captain Hodge said. "We can't cut in winds over 15 to 20 miles per hour, or if the seas are too rough with high swells.

"The kelp beds are mown in swathes similar to an alfalfa field except we cut only one way—with the wind," said the Captain. "If the ship goes through a bed without filling, we go back and cut another swath."

Equipped with a 10 by 20-foot frame at the bow, the C. L. Arques has a 10-foot International Harvester mowing machine cutter bar horizontal across the bottom of an adjustable frame, and two six-foot edging cutter bars upright on each side, at right angles to the bottom knife to cut the kelp clear at the sides.

When the frame is lowered from the bow into the water, the horizontal blade rides about four feet under water. Built around the frame is an endless chain with spiked wooden slats to catch the kelp and haul it back into the barge.

The boat moves ahead at 2 knots—approximately two and one-eighth mph. Loading time will vary, depending on the size and thickness of the kelp bed. Usually, a load of around 125 tons can be harvested in 4 to 5 hours actual cutting time. "We're out 12 to 36 hours," Captain Hodge said. "The crew gets paid by the day. We figure the cost per ton of kelp at dockside

(*Continued on page* 146)

The C. L. Arques (left) ready to unload 125 tons of kelp from the sea meadows. Divers plant the crop (below) on old car and bus bodies, dumped in the sea for kelp anchorage.

Herman's Potatoes BIG

By R. J. McGinnis

HERMAN KAMPING, the potato champ of Oregon, is a big man—240 solid pounds with arms like a blacksmith, and a barrel chest. And he could, if he were out of a shirt, make one from the blue ribbons his potatoes have brought him at the Oregon State Fair and various county fairs.

Against the earnest competition of growers from a great potato state, Herman has taken first place four times in a row, and plans to go right on collecting blue ribbons.

A man in his middle forties, Herman has had a close association with potatoes all his life. "I was raised on potato soup," he says, "and when I could barely walk, bugging the potatoes was my summer work." The first money he earned as a boy he got from a fenced-off part of a feedlot where he raised eight bushels of potatoes. He remembers that he got 38 cents a bushel and spent the money on a new hoe and spade.

Herman was born on a Kansas farm, and he had worked his own farm there until he moved to Oregon in 1944. Back in Kansas it was customary for farmers to raise potatoes for their own use, but Herman planted all he could take care of, along with his dairy herd, and sold the surplus at the crossroads grocery. "What interested me about potatoes was the big yield on a small acreage. I have always made more per acre on my potatoes than on any other crop. They take a minimum of time, too. After planting, which is the big job, you lay them by after four or five cultivations and forget them until harvest two months later."

Seventeen years ago Herman and his wife Vera got fed up with Kansas winters and moved to Klamath County in southern Oregon. Herman worked a dairy farm for a year, but the great potato fields of that county lured him back to his first love. Since then he has specialized in potatoes, with onions and sweet corn to fill out his time. In the off-season he works on construction. Being a big man and thinking big, Herman operates an earthmover and power shovel.

His prize potatoes have been grown in Jackson County in the Medford and Central Point areas, which are not particularly famous for big yields. Klamath and Deschutes Counties to the east are among the big potato counties of the country, but growers there have not been able to equal Herman's quality or quantity in less-famous Jackson County.

The second year Herman raised potatoes in Jackson County he sent a display of both onions and potatoes to the State Fair at Portland. He was busy selling his crop when he received a telephone call from Portland requesting that he proceed posthaste to the fair to receive the silver cup and the appropriate ribbons for his first place in the state, on both potatoes and onions. He has taken the blue ribbon on potatoes every year since. "I haven't tried to show my onions recently," he says. "I have trouble getting them to mature early enough for the fair."

Potato Soil Scarce

Herman's first step in growing prize-winners is to find a suitable piece of ground. "The soils in this valley are not particularly good for potatoes," he says. "There are about a dozen types, most of them clay or clay and sand, and they get hard as concrete in the dry season. Good potato soil is scarce and you never find a big acreage in one place—an acre or two here and there, mostly in the creek bottoms. Potatoes like a very light soil and the best around here is the decomposed pumice soils with sand a close second. The best crop I ever grew was on almost pure sand. Pumice soil is the lightest—light and fluffy—you can roll the spuds out with your hands in pumice.

"They say out here that about all the soil is good for is to hold the fertilizer and the crop. It's short on humus and all the elements, including the trace elements. I look for an old pasture, which is likely to have a good supply of organic matter, or an old alfalfa field. These are hard to find.

"I have always rented potato ground. I pay from $60 to $70 an acre but this is cheaper than owning it. Land best fitted for potatoes sells for around a thousand dollars an acre—some as high as two thousand—and you can't find any large acreage for sale. The rental includes water. If I owned the land and had to pay taxes, plus interest on my investment, plus the water, I couldn't do it for $70 an acre."

Strictly For Quality

The ribbons and citations and silver mugs which Herman has received for his potatoes were awarded strictly for quality. Size was not a prime consideration. Herman sends a display of ten pounds of his potatoes to fairs. He selects ten potatoes, each weighing a pound on the nose. The judges measure and weigh them, and view them from all angles. They even taste them. The State Potato Commission, which supplies the judges, is careful to pick men who have an educated taste in potatoes. Taste and texture are important as well as uniformity of size, freedom from imperfections, color and character. Herman has never attempted to grow the biggest potato in the world, or even in Oregon. "A potato can be too big," he says. "A housewife likes uniform size potatoes, especially if she bakes or boils them. I have turned up odd potatoes that have weighed four pounds and an ounce or two more. A housewife has a psychological twist when it comes to buying and she will pay a dollar for a bag of potatoes, 10 pounds say, with twenty potatoes in the bag. She'd balk at buying a bag of four potatoes weighing 10 pounds."

The yield per acre is not of prime importance to Herman. He finds the higher price he gets for quality more than compensates for quantity, and quality requires less work. He strives for uniformity of potatoes in the hill—a minimum of small, unsalable potatoes, and no giants at all. Both are equally hard to peddle. Last year Herman's potatoes averaged 97 percent Commercial No. 1 and he has never had less than 90 percent salable potatoes in a crop. The small ones, less than an inch and a half in diameter, and the very large ones, he uses for seed.

After trying out many varieties Herman has settled on the Red Pontiac as his favorite for the Rogue Valley soils and climate. The Red Pontiac is a symmetrical tuber, smooth at the eyes, and will bake as well as the famous Idaho baker. It will mash well and Herman says it makes the best fried potatoes in the world.

Herman sells all his crop from his own warehouse, taking a double profit—on growing and on selling. His spuds are known far and wide and from a half to three-quarters of his crop is ordered in advance. Last year he dug his crop in August

and was completely sold out by September. Most of his customers buy enough to last a year—five or six hundred pounds—but he will sell as little as a ten-pound bag or as much as a ton to a customer. Many grocers advertise his potatoes by his name.

A meticulous bookkeeper, Herman can tell you to the penny how much it costs him to grow a potato. "I figure that from the time I plow to the time potatoes are sold I have put out, either in labor or costs, about $300 per acre. Breaking this down, there will be $70 for land rental, which includes water; $65 for seed, $20 for fertilizer, $10 for insecticides and the remainder for machinery use and labor. I charge labor off at $2.50 an hour, whether I do it myself or hire someone."

This year, Herman had one of his biggest crops, averaging more than 21 tons per acre. He was lucky again in that the potatoes came on the market at the peak of prices and he received $5 and $6 a hundred for the entire crop. At an average of $5.50 a hundred, an acre grossed him $2,121. This left him a net profit on an acre of $1,821, which is, as Herman says, "Just about tops for any crop including the high-labor crops such as strawberries and asparagus."

The high profits in growing potatoes in Oregon are known to well-informed farmers in that area. Herman says the reason why everybody isn't raising potatoes is because they don't know how to get both high yields and quality. "There are some other angles too. Good potato land is scarce, but more important than this is the difficulty in marketing at a profit. A man who grows a big crop on large acreage will have to sell through a dealer and will have to compete with Idaho, Michigan, and Maine potatoes in the national market. The dealers will beat him down so much his profits shrink to ordinary size. My potatoes are all sold locally."

As for the know-how, Herman is less positive and extremely modest. He has recently lost all his front teeth and his smile is both disarming and entertaining. When asked about the know-how he smiled and mumbled something about "Anybody can do it." Pressed further, he said, "There's no secret about it. Just do what you have to do at the right time and the potatoes take care of themselves. You've got to have the right combination of soil, water, fertilizer and timing to grow good potatoes."

In elaborating on this rather specious statement Herman says, "I don't plant by the moon and the green thumb theory is a lot of hooey. I plant potatoes on the 20th of April regardless of where the moon is and if the fellow in the next field would follow every step I take in growing a potato he would grow just as good potatoes as I do, whether he owned a green thumb or a red thumb. The county agent once said to me, 'Herman, your prize potatoes are a mixture of brains, commonsense, and fertilizer.' "

Herman, when pressed, spells out step by step how he grows his potatoes. "First I get me a field with the kind of soil that I know potatoes like. Then I take in my moldboard plow and I plow deep, usually not less than 10 inches. Year before last I plowed 17 inches in sand. I didn't turn up

any soil, it was almost pure sand, so I knew I'd have to pour on water and fertilizer.

"After I plow I prepare the seedbed with a drag or a disk and furrow it out. The furrows are four inches deep. Then I put in an insecticide for the wireworms. I use the granular form and put it in the bottom of the furrow. Then I drop the potatoes by hand, about 10 inches apart. Hardly anyone uses planters here in the valley. I use some of my own seed and buy some. I plant the smaller potatoes whole and cut up the larger ones. Sometimes I get multiple stalks in the hill but usually only one develops into a potato-bearing plant. The seed for an acre weighs about 1200 pounds and I use an equal amount of 12-12-12 fertilizer, pound for pound. The fertilizer I drill on each side of the row a little deeper than the potatoes. I put this in by tractor applicator in a band about four inches from the seed and I put it in before I cover the potatoes so that I'll know exactly how deep I am going and how far away from the seed. This partially covers the seed but I go over it to cover the seed to about four inches.

"In about three weeks the plants are up and I give them the first cultivation, hilling up the row. I keep hilling up the row until the seed is about nine inches below the top of the ridge. If I ridge them up more they will get cold and won't grow well, and if I ridge them up less than that some of them will be exposed and get sunburned. As it is, most of the potatoes will not be more than an inch or two below the surface when I dig them. I give them 3 to 5 cultivations, depending on the weeds. I do this within six weeks after they are planted. In six weeks the plants are too large to cultivate and the potatoes have begun to form. After I lay them by there's nothing to do but keep them watered."

Herman's irrigation management is probably his biggest secret. He would not be reluctant to divulge the secret if he knew it himself. "I don't want to keep anything from you," he says, "and I'll tell anybody what I do. What I can't tell you is when I think a potato plant needs water. I suppose it's a version of the green thumb theory. Over in Klamath Valley potato men say they determine water needs by the color of the plant. My eye isn't that good. The depth of the water table is a good guide to irrigation, that is if you have a water table. Last year in the deep sand there was no water table within reach of the roots. I like to keep it at around twelve inches when I can. If I can't find a water table, I squeeze a handful of soil and if balls up it's too wet, and if it crumbles it's too dry. I usually don't irrigate until after the first cultivation, then I let the dampness go up the ridge about halfway and stop. I want the potatoes damp but never wet. On sandy soils this may be every other day, on soils with good humus and some loam mixed it may be once a week. I use furrow or flood irrigation exclusively. Very few growers around here use sprinklers.

"I dig my potatoes about 90 days after they are planted. Just when I dig them depends upon when the small potatoes in the hill have reached market size. The tops are still green and the potatoes would grow some more, but then the big ones would get too big and likely crack and split and there might be some deformity. I dig them with an ordinary middle buster or potato plow—roll them out and then pick them up.

"Very few combination potato diggers and sorters are used around here. First, they're expensive, and second, our potatoes are so thinskinned that you would get a lot of bruised and skinned potatoes digging

(*Continued on page* 122)

The Motor for the Job

By John Jeffers

THE ELECTRIC MOTOR on your elevator burns out. How do you go about buying a new one? You may have bought a new bunk feeder without the motor. You think you'll shop around and get a second-hand or surplus motor to save a bit of money. Fine, but which type of electric motor should you choose? It's probably best, and easiest, to use the motor recommended by the manufacturer. But if you can't, or don't want to, how can you make a reliable choice? It is not simple, as an electric motor is not like a tractor. You can't buy a "general purpose motor" that can be used by every job on the farm.

C. P. Wagner, farm electric adviser for the North Central Electric League in Minneapolis, Minnesota, consultant to the upper Midwest electrical industry, believes farmers choose motors without enough care. "The farmer shops around too much. Too often he doesn't find out enough about the motor from the seller. Some people who sell motors are indifferent to the job that motor will do. That means a farmer must be careful what type of motor he gets—especially for heavy-duty farm work like frequent starting jobs with a heavy starting load."

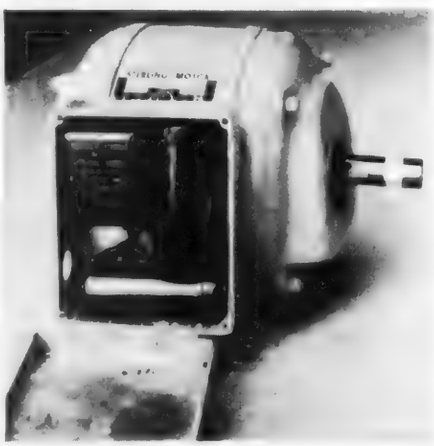
There's a lot more to choosing an electric motor than simply picking one of the right horsepower, connecting the right size wires and throwing a V-belt around the pulley. There are at least a dozen different types of electric motors. Six of these types are commonly found in house or farm operations. About four of them are sufficiently interchangeable that a farmer might have to choose between them. Those four are split-phase, repulsion start motors (RI), capacitor, and three-phase motors. There are variants of each type.

If he picks the wrong type of motor a farmer will find, at worst, it will not work at all, or burn out. At best, the wrong motor will cost more, or be more expensive to install and run. It may blow fuses or demand heavier wiring than the right type.

Voltage and Phase

Most farms in the United States have single-phase, 120/240-volt electricity. A few may still have only 120 volts. A small but growing number have three-phase supply usually at 220 volts. This is easy to recognize. Single-phase, 120 volts, comes to the farm in two wires, from one transformer near the farmstead. Single-phase, 240 volts, usually comes on three wires from one transformer. Three-phase electricity comes from three of four wires, and there are usually three, occasionally two, transformers on the service pole. (There is a phase converter which permits three-phase motors to operate on single-phase lines. It is not popular.)

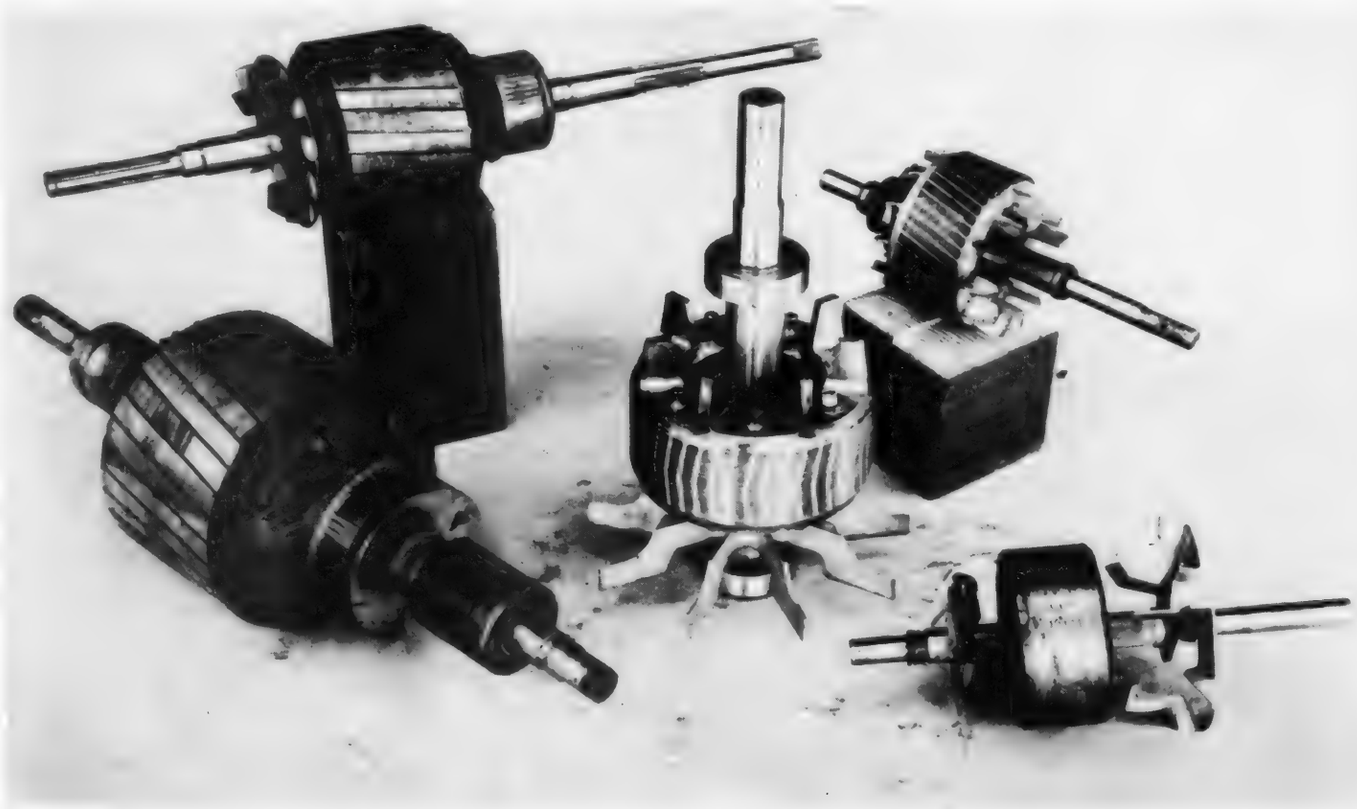
Power companies and the National Electric Code limit the horsepower of motors



A capacitor motor (above) has the capacitors somewhere on the frame. Here they are in a box on the side. They may be in a tube on top, or hidden in the housing. They are usually easy to find. The armatures, or rotors (below), identify the type of motor.

The two rotors on the left are from RI motors. They have commutators (the segmented copper section at right of both rotors) and the exposed wires. The two rotors at right are from capacitor or split-phase motors. There are no commutators or visible wires.

In the center is a three-phase rotor, similar in appearance to the capacitor type. The RI armatures are generally longer than other types, to accommodate the commutators. The spider-like arms are fans. On the left side of the smallest rotor in front is a centrifugal switch.



on the different types of electricity supply. A 120-volt, single-phase supply should not usually take more than one-half horsepower. And 240-volt, single-phase is often limited to a five horsepower, 1750 rpm motor, although 7½ or 10 horsepower may be permitted. (The current taken by any motor will vary with its rpm.) On farms with three-phase supply, motors of several hundred horsepower may use the line. In all cases, the farmer must provide adequate wiring from the transformer to the motor, and the power company must always know the number and size of large motors. (Three-phase supply may be compared to three small men, each with a hammer, alternately driving the same nail. A single-phase supply is like one big man with a hammer driving a nail. In three-phase supply, pulses of electricity follow each other in three separate wires. The pulses occur at the same frequency—60 pulses or cycles per second—as single phase, but there are three times as many of them.)

All three-phase motors are inherently self-starting. Three-phase power produces a rotating field in the motor. This is what is needed to start the rotor turning. Single phase produces a pulsating field, causing no rotation, so it's necessary to put in auxiliary devices to produce a rotating field. There are several methods and they determine the type of motor. They also complicate the motor, and so a three-phase motor usually requires less maintenance.

(Below) On the left is a three-phase motor. At right is an RI, with four brushes riding on the segmented commutator. The RI has four clumps of windings, the three-phase has a regular pattern of wires. A capacitor motor has a winding more like the RI, with clumps of wires.

Types of Motors

Take a deep breath, and we'll go to the different types of electric motors. On the farm the four most important types are:
Split-phase motors.
Capacitor motors (There are several kinds).
Repulsion start-induction run and repulsion induction motors. (We'll call them both R.I. They have similar design.)
Three-phase motors.

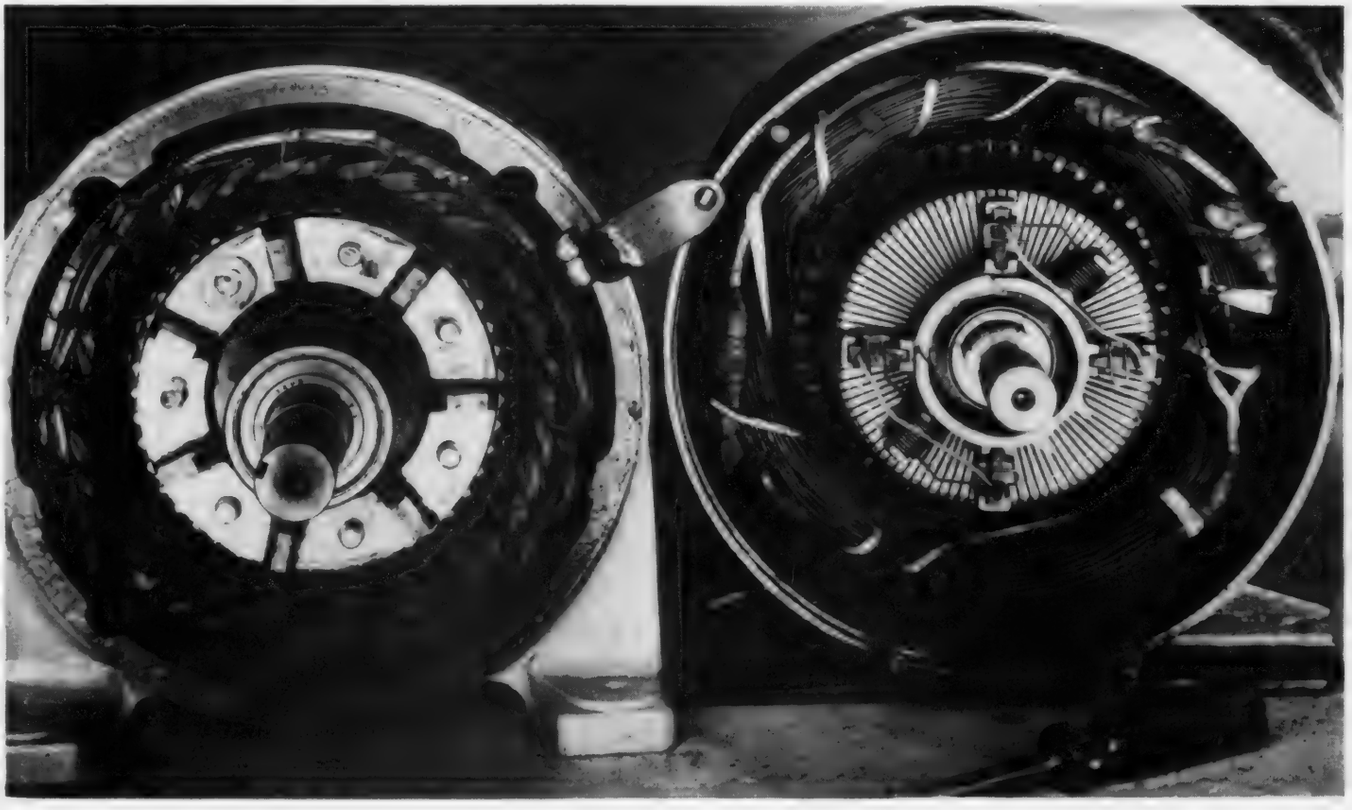
The three-phase motor can be described quickly by saying that if you have three-phase supply use a three-phase motor for everything where the power is available. It will handle a high starting load at a reasonably low starting current. Although it generally is more expensive to have three-phase wiring installed on a farm, the cost of operation is slightly cheaper than most single-phase. The motor is simple to reverse. Three-phase is almost essential above 10 horsepower.

The split-phase motor is available only in small sizes, usually under ⅓ of a horsepower. It is low in cost, and built for only one voltage, so when buying it you must decide whether it will run at 120 or 240. It should be used only for low starting loads where starting and stopping isn't frequent. The motor is usually reversible. (For safety, all motors should be stopped before reversing.) It adapts to many farm jobs and gives excellent service on small fans or blowers, small conveyors and seed cleaners. The disadvantage is that it draws from 6 to 8 times its normal running current when starting. On starting it will cause a noticeable flicker in lights on the same circuit. It usually runs at 1725 rpm, but can be designed for several other speeds.

General Farm Work

The most common motors around a farm are single phase and between ½ and 5-horsepower. They fall in two general types—the capacitor motor, and the RI motor. One basic difference between the two types is their starting torque. The RI motor can have a very high starting torque, with a low starting current. The capacitor motor can be obtained with a high starting torque, but will have a higher starting current. But the capacitor motor is usually slightly cheaper to operate and a little cheaper motor to buy. The rule for their use then, is that the RI motor, or a special design capacitor motor, should be used for any job with a heavy starting load such as a silo unloader, or a barn cleaner. The general purpose capacitor motor and, of course, the RI, can be used on grinders, blowers, pumps, bunk feeders, feed mixtures, conveyors, elevators, fans, air compressors, and crop driers. The capacitor motor has the edge over the RI when it comes to repairs and maintenance. One manufacturer of silage unloaders said, "We have had a lot of expensive motor repair on RI motors, which is something you don't have with a capacitor motor. As a rule, when a capacitor motor fails it is only a burnt-out starting switch or capacitor. Neither one is very costly to repair."

But the RI motor has been called the "workhorse of the farm" because of its wide application. Both of these types of motor usually run at 1,750 rpm. But other



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What happens if you 'risk' the wrong motor on a silo unloaders, for instance? One manufacturer, who makes and sells both RI and capacitor motors, said, "We have had a great deal of experience testing both these types of motors on silo unloaders. We are very positive that most capacitor motors are entirely inadequate for silo unloaders for the following reasons:

1) High starting current to get enough torque.
2) Inability to start on low voltage.
3) The effects of cold weather on starting ability."

Some capacitor motors, designed specially for silo unloaders and barn cleaners, have become more common recently. They have been doing a good job and have, as mentioned, maintenance advantages over the RI motor. You can buy them, new, at distributors, but few are available used or surplus, etc. They are specially designed and shouldn't be confused with older capacitor motors, or general purpose capacitor motors, which are more common, and won't handle certain jobs.

Recognizing the Type

You'd think, with the classes of motors as different as they are, that various types would be labeled on the nameplate of the motor. Unfortunately, this isn't so and the type of motor can't always be determined from outside appearance. Any reliable dealer can tell you what type of motor he is selling. An electrician should be able to identify the type of motor you already own. Or the manufacturer can always identify the motor from the nameplate. A farmer should know the type of a motor before buying it. With a little care you can usually determine the type of motor yourself by examination:

(1) An RI motor has a commutator divided into copper segments on which carbon brushes ride. The brushes conduct electricity to the starting coils on the armature. (The armature, including the commutator, is the part of the motor which rotates with the drive shaft.) As the motor gains speed a centrifugal switch short-circuits the starting coils and allows the motor to run as an induction motor. On the RI motor these starting coils are visible—insulated wires wound around the armature. These wires and the carbon brushes are only useful during starting. At running speed, the brushes may ride the commutator or be lifted off automatically depending on the model. If they lift, there is no direct connection between the armature and the electricity supply. In either case rotor current is induced. It is the wiring and brushes on the armature which increase the expense of the motor and give it its high starting torque at low current. The RI motor will usually be larger and heavier than a capacitor or three-phase of same horsepower, due to this equipment. If an RI motor is stalled on its starting load, it can cause expensive damage. These armatures cost time and money to repair.

(2) A capacitor motor can be recognized because the capacitors are to be found somewhere on the motor. They may be in a corncob-sized casing along the top of the motor, or in a square box to one side, or hidden under the end housing, or in the motor feet. The capacitor occasionally is separate from the motor in an oil-filled sealed can. In all but the last case, removing a couple of screws will reveal one or two cylindrical capacitors, usually with two wires leading from them. Capacitor motors, too, have switches that operate as the motor comes up to speed. But the armature is solid, smooth-looking, with no wires, and no commutator or brushes.

(3) The split-phase motor is very similar to the capacitor motor except that it does not have capacitors—and the split-phase motor usually does not exceed ⅓ horsepower.

(4) The three-phase motor will almost always be so labeled on its nameplate.

Though the nameplate does not usually say if a motor is RI or capacitor, it nevertheless offers a wealth of information about its performance. "The nameplate is the birth certificate of a motor," said William A. Junnila, USDA electrical

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engineer at the University of Minnesota. "Unfortunately we find some motor plates with much of the information missing. They are just labeled 'Farm Motor.'

"This is a pity because a farmer can get a lot of information from the nameplate about the motor he is going to buy. The plate should show the horsepower, the voltage, the amperage, and the rpm among other things. Most of them go this far. The nameplate also should have the code letter. This code letter applies to all motors," continued Junnila. "The higher the letter in the alphabet, the higher the starting current. This code can have an effect on the fuse requirements of the motor. For instance, a 3 hp motor with a C code might have a starting current of 60 amps, whereas the same motor with a F code would take 90 amps starting current.

"The next thing you should be able to learn from a nameplate," Junnila went on, "is the service factor (SF) and temperature rating. The SF tells you what continuous overload the motor is designed for. As a general rule, all open motors over 1 hp have a service factor of 1.15, or can carry a 15 percent overload continuously. Small general-purpose motors usually have a service factor of 1.25, which means they can be operated at 25 percent overload. If you buy on price alone, you may get a motor with no overload capacity. Look on the nameplate for the service factor."

The temperature rating shows what continuous temperature the motor can take.

The insulation code letters are:

Class	O	90°C	194°F
"	A	105°C	221°F
"	B	130°C	266°F
"	F	155°C	311°F
"	H	180°C	356°F
"	C	220°C	428°F

Class A is standard, and commonest for farm use. Class B may be used on special applications. Don't use O, F, H or C. A motor may be labeled "40°C" or "40°C Rise." This usually means it can stand 40°C (104°F) *above* the air temperature.

You cannot tell how hot a motor is by touching the frame. The heat that reduces the life of the motor is internal.

The next important figure on the nameplate is the time rating. This is the time for which a motor can be run continuously at full load without overheating. It may be 30 minutes, one hour, or more likely continuous. A continuous rating means the motor can be run for any length of time under full loads without overheating. The short time rating is a guaranteed minimum. Some short-time motors may run continuously in some conditions. But if you get a motor designed for industry, not farmwork, beware of short time ratings. With short time ratings, you want to be sure that a year from now your requirements haven't changed. For instance, if a silage unloader has a half-hour rating, you might find in a year from now you have a bigger operation and you run your silage unloader for longer than half an hour. This can cause cutting

out of the motor, and the overload device will have to be reset after it cools. So don't take a short-duty motor from one job and put it on a continuous-duty job.

Farm motors may have a reset button on them. This is an overload protection which switches the motor off as it becomes overheated. If it trips, look for the trouble. Fans may have frozen up, bearings seized, augers plugged, etc. The overload protector usually must be reset by pushing a button on the motor. It can only be reset after the motor has cooled. This may be a matter of minutes—up to maybe 15 or 20. Some motors have an automatic reset; that is, the protector will automatically re-close when the motor has cooled sufficiently. The manual type is best for farms. It could be extremely dangerous for an automatic reset to start the motor while a farmer was investigating the stoppage. This has happened. If the nameplate says "overload protector," and you see no reset button, beware the motor might be automatic reset. Furthermore, as one manufacturer said, "If the farmer has to climb the silo a few times to reset a button, he'll be less apt continually to overload the motor of a silo unloader."

The problem of temperature rating on a motor is very closely connected with the protection of the motor from dust and dirt and moisture. It is easy to design a motor with a continuous rating by having it open at both ends so a fan can pull air through the windings. But this leaves the motor open to dust, dirt, and moisture.

The smaller capacitor motors have visible capacitors. The tube (right) on top differentiates the capacitor motor from the split-phase motor.

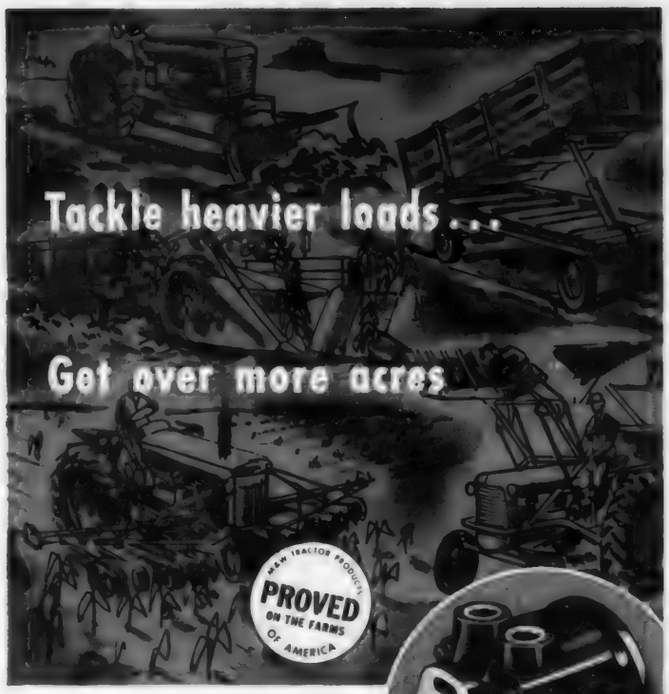
There are several different degrees of protection on a motor—open motors, drip proof motors, and totally enclosed motors. The price drops in this order:

1) Totally enclosed continuous.
2) Drip proof continuous.
3) Totally enclosed short duty.
4) Drip proof short duty.

A continuous rated totally enclosed motor is usually larger and more expensive. A totally enclosed short duty motor is usually the same size as an open motor and nearly the same price. Experience with totally enclosed RI motors has not been good. Drip proof with screens are commoner and better. Moisture can still get into a totally enclosed motor. Drip plugs are used to drain them. Some manufacturers build a capacitor motor with the starting switch and capacitor enclosed. Here the vital elements are protected, and the windings are open to get continuous rating.

Demonstrations

"Don't be deceived by the short-term performance of an electric motor in a 10 or 15-minute test," said William Junnila. "A motor may run under extremely heavy overload for a short time, but you can't expect that sort of performance out of it continually. You also have to be aware of changing loads. For instance, the density of silage in a silo increases considerably as you get lower down the silo. Silage may weigh 32 pounds per cubic foot at the top and as much as 60 pounds per cubic foot at the bottom. It may take a heavier duty motor to get the same silage per hour out of a silo. Perhaps the motor with a half-hour rating was sufficient at the top, but cannot remove enough silage within its time rating at the bottom. Of course, the failure may not be due to the motor; it may be some other part of the equipment. With bottom unloaders, the



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heaviest load is when the silo is full. Also, it's important to know if you will use a motor for more than one job. If you substitute between a crop drier and a silage unloader it's essential to get a motor that will handle the heaviest job satisfactorily.

"Another problem is overloading the motor. I've heard people say, 'Lower the silage unloader until you hear the motor speed drop.' You can't hear a motor slow down until it has lost at least 150 rpm. All motors increase in horsepower as they slow down. But a drop of 150 rpm may double the horsepower of some motors, and increases the current and heating of the motor considerably. Temporarily you can get a good demonstration, but you can't expect this kind of performance day in and day out. If the motor is slowed down so you can hear it, 9 times out of 10 it's overloaded more than it should be. An ammeter is the answer, although I found abuses of this. An ammeter shouldn't be used as a meter of silage output. It should be used to see that the motor isn't being overloaded. When the ammeter registers more current than is shown on the motor nameplate (allowing for the service factor), the unloader should be raised until the current drops back down again. Another good tip is to raise the silage unloader off the silage if you can, when you're through, start it suspended, and then drop it down until it bites into the silage.

Maintenance

"I'd like to see every motor have a card on it with the greasings schedule, type of oil or grease, and any other important details about the motor," Junnila said. "You might write on the same card the number of the V-belt it uses. This would really simplify the attention the motor needs."

Greasing or oiling times vary with the motor. Some new motors go five years without grease. Then the manufacturers recommend the motor be removed, cleaned, and the bearings repacked with grease. Ball bearings go longer without attention than sleeve bearings, and newer motors are going to ball bearings. There is a trend toward permanently-lubricated bearings.

On old motors sleeve bearings need oil once every two to three months; ball bearings probably every six months. Over-oiling or greasing is as bad as none at all.

The RI motor needs attention to the brushes and commutator once a year. They should be cleaned, and brushes replaced if necessary. All screens and windings should be cleaned. Every three years or so it may be necessary to replace the spring in the centrifugal switch on capacitor and RI motors. If a motor stands a year or two without use the grease may harden. If the motor is then run without regreasing, bearings can be quickly damaged.

One farm engineer who has installed a lot of electrical equipment has a good tip for the selection of a motor. "We like to suggest using a bigger motor than you think you need," said Ken Westerberg, of Farm Engineering, Savage, Minnesota. "Get a motor that's not always working to its maximum load," he said. "Have a little reserve, not only in the motor, but in the wiring system itself. I mean using a 2-hp motor for a normal 1½-hp job, or 3-hp for 2-hp job. If you think a 3-hp is adequate put on a 5-hp. Size your wiring accordingly so you have reserve in the wiring as well. The life of an electric motor is indefinite especially if it's properly applied, and if you have some extra power in the motor you can avoid overloading it. I always tell farmers that the cost of running a 3-hp motor with a 1-hp load for practical purposes is about the same as the cost of running a 1-hp motor. But," he cautioned, "remember, if you put on the 3-hp motor for a 2-hp job and then demand 3-hp from it, you are in the same position as when you started. An ammeter is the answer here. And remember, it's better to have the wiring one hundred percent oversize than five percent undersize."

There are many other different types of electric motors. The Universal type, found in most portable electric hand tools, like electric drills, saws, sanders or clippers, has a very high starting torque and a high overload capacity, but this type of motor is usually built into the equipment. Two other types are the shaded pole motor, and synchronous motor, for very light loads such as electric clocks, timeclocks or program timers for automatic equipment. These, too, are usually built into the equipment.

For most farm jobs it pays to know what type of motor is the best for the job. It doesn't necessarily follow that the type the manufacturer used is the best one for the job. He may have been influenced by initial cost and availability rather than efficient operation, and farmers have been too price-conscious. The deficiency may not show up for a number of years, but the wrong type of motor sooner or later will fail, or cause poor operation. With proper application and maintenance, electric motors should last 15 to 20 years. The life of a motor can far outlast the equipment it drives. Adequate wiring is 50 percent of motor installation. Motors have a great capacity to work if you pick them right and treat them right.

THE FARM'S PICTURES

Cover by Josef Muench

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one of the great men of agriculture,
Arthur Young, 1741-1820

By Grant Cannon

KING GEORGE III rarely traveled without a copy of Arthur Young's agricultural writings; and the King's archenemies, George Washington and Thomas Jefferson, were equally avid readers. Washington wrote dozens of letters to Young seeking advice and exchanging information on farming practices. The Duke de Liancourt sent his sons from France to study with Young, and the Empress Catherine of Russia sent a trio of elegant students to sit at his feet. The learned societies of Europe and America enrolled him as a member. He was made a Fellow of the Royal Society of England because of his agricultural work, and was awarded three gold medals by the Society of Arts for his achievements.

As a farmer this tall, distinguished-looking writer was a complete failure. Not once, but many times, Young proved that what he could do so well with a pen he most emphatically could not do with the plow.

Arthur Young was born September 11, 1741, the youngest of three children born to Dr. Arthur Young—who, among other things, was the rector of Bradfield Parish—and Anna Lucretia de Cousmaker, a wealthy woman of Dutch descent. Early in his life the family moved to Bradfield Hall, which had been in the possession of the Young family for over a century.

As a boy he was sent to Lavenham School to learn Latin, Greek and arithmetic. While there he learned to hunt partridges with the headmaster. He learned to hate pudding which was served daily and, he later admitted, he learned very little else. Judging by his later life, his most typical act in school was to begin writing a book—The History of England.

When Arthur Young was 17 his family apprenticed him to the mercantile house of Robertson of Lynn to study mercantile accounting with the idea that he might later join the firm of Tomlinson & Co., which was owned by his sister's husband. Young found the life dull and detestable and felt he learned nothing by his three years' training. In this he was certainly wrong, for in all his agricultural writings there is an insistence on proper accounting and good cost records. While an apprentice, he continued his writing. His first effort was a political pamphlet on the French and Indian War, *The Theatre of the Present War in North America.* He traded this manuscript to a publisher for 10 pounds' worth of books. After this he wrote four novels: *The Fair American; Sir Charles Beaufort; Lucy Watson;* and *Julia Benson, or the Innocent Sufferer.* These too he traded for books.

During his apprenticeship his older sister died, which apparently ended any thought of his entering her husband's firm. A year later his father died.

Upon completing his apprenticeship Young felt that he was left without any pursuit or profession. He immediately went to London to live with an uncle and began publishing a magazine of his own, *The Universal Museum.* In this publication he wrote most of the articles, and solicited other material from the leading writers of his day. After the fifth number had been published, the leading literary figure of England, the great Samuel Johnson, not only refused to contribute to the journal but also persuaded Young to abandon the venture.

Arthur Young, the Farmer

With the ending of his first publishing venture came a request from his mother to return to Bradfield and take over the management of one of her farms. The Latin and Greek he had learned in school, and the hated accounting he had been taught as an apprentice did not fit Arthur Young for agriculture. Most farmers of his day worked their land the way their fathers and grandfathers had before them. Young lacked this lore. He clearly recognized his deficiency and set about remedying it in the most disastrous way—by experimenting.

Soon after he returned to Bradfield to begin his farming career he married Martha Allen and brought his beautiful, but quarrelsome wife back to Bradfield to live with his strong-willed mother. This arrangement lasted for two years and then Young gave up his mother's farm and leased a 300-acre farm, Samford Hall in Essex. For four more years he continued his experiments in agriculture and learned the hard lesson that an experimental farm is not a paying proposition. He finally paid a farmer 100 pounds to take the place off his hands. The practical farmer immediately made a fortune on this same land with normal farming methods.

Arthur Young was not through with agriculture then or for the rest of his life. He immediately set about finding another farm and secured 100 acres of land in Hertfordshire. Writing of his third farm he said, "I know not what epithet to give this soil. Sterility falls short of the idea—a hungry, vitriolic gravel. I occupied for nine years the jaws of a wolf. A nabob's fortune would sink in the attempt to raise good arable crops upon any extent in such a country."

During these years Young was constantly in debt and continued farming only by supporting the farms with his writing.

He soon learned that experimentation was not the only way to learn agricultural practices. A second way was to visit successful farmers and learn their methods. This he did, and his own searchings in agriculture gave him a keen eye and a demand for a practical test of each new agricultural practice. What Young saw he wrote, and what he wrote others read with great interest.

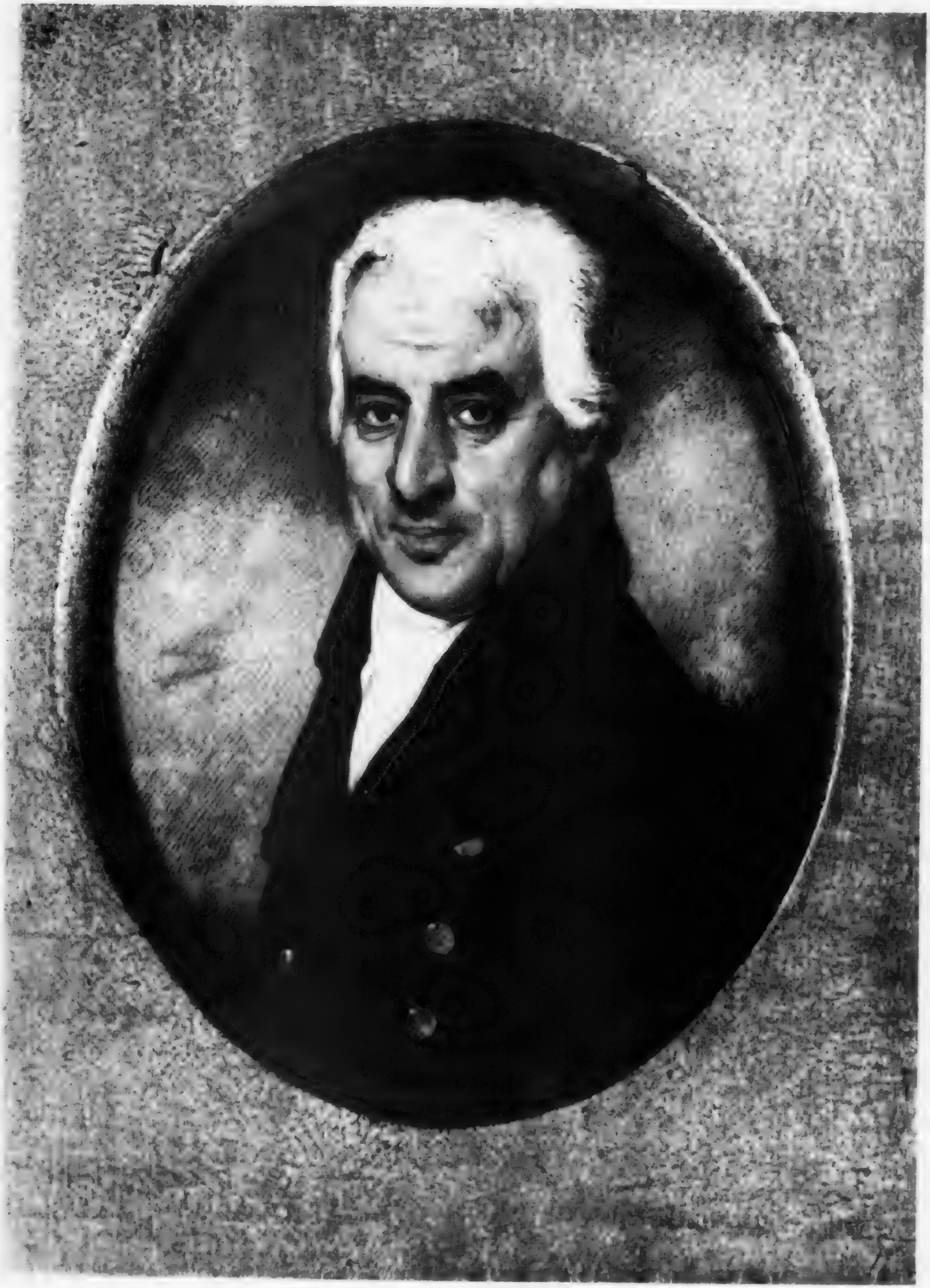
Arthur Young, Agricultural Writer

While Arthur Young, the farmer, continued to experiment and flounder, Arthur Young, the writer, began publishing authoritative accounts of English farming. After four years of farming he published *The Farmer's Letters to the People of England.* Though this book was well received, Young himself later said, "The circumstance which perhaps of all other in my life I most deeply regretted and considered as a sin of the blackest dye was the publishing the results of my experience during these four years which, speaking as a farmer, was nothing but ignorance, folly, presumption and rascality." This book, along with one other which he wrote a few years later, *A Course of Experimental Agriculture,* Young came to regret so much that he attempted to buy up all the copies and burn them. Of his many other books he remained justly proud.

After Young left the 300-acre farm called

(*Continued on page* 140)

Arthur Young was 70 when he sat for this portrait by Charles Jagger. It is reproduced here through the generous cooperation of the Royal Agricultural Society of England.



By Joe Muir

Imperial Pasturing

Pasturing winter alfalfa is big business in the Imperial Valley.

"THERE'S NO TRICK to pasturing lambs safely on alfalfa but it takes exact timing and precision management," Clay Broadbent said as he picked up the telephone. "Hello Lencio! Chutes and corral up, lambs eased in close? O. K. I'll meet the trucks and we'll get 'em sorted."

Clay, a husky, confident and energetic young man, balding at 38, and his older brother Jay are partners in the Broadbent Livestock Company. Their business is fattening feeder lambs on irrigated alfalfa pasture each winter near the Mexican border in California's fabulous Imperial Valley.

It all began back in the early 1930's when Jay and a few other sheepmen from the mountain states, checking on feed supplies, found that lambs could be fattened safely and economically by pasturing them on leased alfalfa fields during the winter months, when cold weather slows plant growth to an uneconomical stage for haymaking or dehydrating.

Starting with a few thousand head, this activity has grown to over 200,000 lambs coming into the valley each fall.

Cattlemen, too, found the lure of the lush alfalfa profitable. A typical procedure is to sort incoming cattle in the fall, the heaviest going directly into feedlots and the lighter, some 60,000 head this past year, going on alfalfa pasture to put on a hundred or so pounds before feedlot-finishing to Choice grade. These practices contribute several million to Imperial County's impressive total of $137,000,000 annual income.

The Imperial Irrigation District, the world's largest, supplies water to 440,293 acres of land. Of this, 204,000 acres on more than 3,000 farms were planted to alfalfa in 1959, the largest single crop grown in Imperial County. This supplies the winter lunch bucket for almost a quarter million lambs.

The cycle begins with the birth of lambs from March through June, in the mountain states. Many of these lambs are marketed direct from their mothers as milk-fat lambs. The balance are marketed as feeders or are brought into the Imperial Valley and placed on alfalfa pasture beginning in late September and extending into March.

The feeders from Broadbent herds in Utah and Wyoming are shipped by truck to El Centro. Jay and Clay also buy several thousand other lambs throughout the mountain states. These feeder lambs will weigh from 55 to 70 pounds on arrival.

"We buy both blackface and whiteface lambs. Most range bands now are the Rambouillet-Columbia open-faced type ewes and they are crossed with Suffolk and Hampshire rams," Clay said. "Gains are not necessarily higher on blackface lambs but they finish out faster and have a blockier conformation.

"As soon as we know how many lambs we'll have, we set up the number of bands and go out and lease the acreage of alfalfa we'll need to pasture them from the last of September to March 1, a period of 150-160 days," Clay explained. "A band is counted out at 1,550 head and we figure it will take from 200 to 350 acres of alfalfa to provide the necessary pasturage to fatten them.

"Since we've built up our numbers to around 44,000 head and have gone back to the same farmers each year, we seldom seek out new farmers for more land to lease. But we've dropped some farms from our schedule. We go back to the ones who do a good job of fertilizing and taking care of their alfalfa. This year we're leasing from twenty-two different farmers as well as hiring a contract feeder to handle seven bands."

Leasing

The alfalfa fields are leased on a per-head, per-day basis. This charge has varied but has been 3 cents in recent years. Sheepmen have paid as much as four, and as little as one and one-half cents.

One acre of alfalfa will pasture five to ten lambs per season and it will be grazed off three to four times during the 150-160 day period, with about 35 to 40 days between grazings. This figures out at about $35 per acre. Most of the farmers are happy with the arrangement and hope the sheepmen keep coming back every winter.

Steers on pasture are charged 75 cents per head per hundredweight per month. Thus a 500-pound steer would be charged $3.75 per month. At the end of each 30 days the weight is recalculated.

Since most farmers do not have any scales, they take the cattlemen's word for the average weights of cattle. Some make a flat charge per month based on the average weight over the pasturing period.

"It might sound funny," Clay said, "but farmers seldom buy lambs or steers to pas-

A canvas blind is used to run sheep into the sorting chute. Fat ones are shipped to the Los Angeles market; thin ones go back to alfalfa. Signal Mountain in the distance is in Mexico.

ture their own fields. And stockmen seldom buy farmland to raise their own alfalfa. Each has his own basic needs. The farmer's home is usually on the farm or in a nearby town. He's not gallivanting all over the country chasing lambs, and," Clay spread his hands, "farmers just naturally don't like the damn things.

"Now sheepmen first of all love these bleating creatures. We accumulate the necessary equipment such as camp outfits, trucks, fencing material and train a competent crew. In the Imperial Valley, most good sheep herders are Mexican. I speak Spanish fairly well, but it's my foreman Lencio's job to train the crew and manage the hands."

Lencio is a nickname with no particular spelling. Its owner is a short, heavy-set, middle-aged man with a keen eye and pleasant smile. His real name is Florencio Lizarranga. Born in Mexico, he came to America many years ago to work for the Cudahy Packing Company. Now a naturalized citizen, Lencio is one of the Valley's best lamb and pasture managers and has been with the Broadbents for several years. He has the job of coordinating 29 bands of lambs on 22 farms, all within a 15-mile radius from the central headquarters 10 miles southwest of El Centro and only a few miles from Mt. Signal, 2,262 feet high, which is just across the international border in old Mexico.

Lencio has a large blackboard in the office listing the names of all the farmers. He has columns ruled off indicating the number of fields in each farm, what band is on which field and how many days they have before they must be moved. There is also a mark to indicate lambs about fat enough to start sorting for market.

By sunup each morning Lencio makes the rounds visiting each band. He checks to see if the lambs are filled up and doing all right.

He's found that lambs begin eating shortly after daylight, will continue eating until around 9 a.m., then shade up, as he calls it, until about 4 p.m., when they move out and graze again until about dark. Lambs will graze about eight hours each day including going to water and licking salt. A band of 1,550 will eat 25 to 30 pounds of salt per day.

After checking on the lambs, he notes the condition of the field. If it has been grazed off quicker than he anticipated, he may speed up the moving date to some other field. He will then visit the other ungrazed fields and check the growth and maturity of the alfalfa. Clay accompanies him many mornings when there is time from his other duties of buying lambs, sorting and shipping them to the Los Angeles market.

Back in the office, Lencio outlines his plans for the day. A typical day goes something like this: One band at Johnson's will be moved to field No. 2. One band at Peters' to go across the road to Jensen's No. 1 field. The fence crew will take down the fences at the Johnson and Peters fields and put them up on Johnson's No. 3 field and Jensen's No. 2 field. Clay has tagged a band on Wilson's to be sorted and shipped tomorrow; so have a crew put up a corral and sorting and loading chutes near the road so trucks can get in. Send one man with salt blocks for each new field and pick up blocks from fields vacated that day. Check out the water supply. And so goes the day as the orders are issued and the crews begin the work. It takes a crew of 20 to 30 men, including herders, to handle the workload during the peak of the grazing season.

"And," smiled Lencio, "the boss says my job is to keep farmers happy. If we don't get the lambs moved when it's time to irrigate, the farmer is mad. And, if we don't move in and eat it off when it's ready, he's mad again. If we let lambs get into another crop, we're really in trouble!

"That's why we use a lead sheep," Lencio said. "This helps to keep them moving down a road as one sheep will follow another. And we have a good-sized crew helping herd them."

Contract Feeder

The morning I visited Clay Broadbent he sorted a band of lambs near his headquarters, then we jumped in his pickup and raced 20 miles to Holtville to sort another band being handled by Lyman Redd, a successful lamb feeder contractor and vice president of the Imperial Valley Lamb Feeders Association.

One of the few contractors in the valley, Redd is offering his managerial skill, equip-

ment and organization for a fee of one cent per head per day. He arranges for the alfalfa and takes care of all details. All a sheepman has to do is deliver him the lambs. The sheep owner pays the three cents per head per day, plus the one cent to Redd. This year Redd handled seven bands, totaling 10,850 head for the Broadbents.

Economics

"Don't ask me how much we make per head," Clay said. "You'll find out how many stupid blunders I've pulled in buying and selling."

Lambs brought into the valley weigh from 55 to 75 pounds on the average. They will gain 35 to 50 pounds and shear 4½ to 5 pounds of wool. A sample market lot weighing 107 pounds and selling for 19 cents, plus a $2 wool clip, would bring a total of $22.53 per lamb. Pasturing costs at 3 cents per head per day for 150 days are $4.50. Other costs of herders, transportation, losses, shearing and other overhead items bring total expenses to nearly $7.

A lamb bought at 16½ cents per pound as a 70-pounder would cost $11.55. Add the $7. for a total of $18.55. This leaves a net of $3.98 before taxes. Lamb feeders through the years feel a net of $3 to $4 per head is a fair profit considering investment and risk.

"You can figure costs and profits any way you want to." Clay said, "but the key to success of this pasture deal is precision management. The lambs must go on alfalfa at the right time, be sorted and shipped when fat, and we must coordinate them with the rotation of the farmers.

Bloat Danger

"We only lose lambs through stupidity," Clay said. "You've got to keep 'em full, never let 'em get empty. When our lambs first arrive they are tired and hungry. We sort them for size and put them on dry hay for two days before turning them on alfalfa.

"Bloat is possible but we seldom have any. We head it off by always checking the alfalfa for readiness to graze. If you wait until the alfalfa is mature enough, about in the bloom, you're fairly safe.

"I give alfalfa the snap test," Clay said. He walked into a new field where a band of lambs had just been driven and pulled a handful of alfalfa. He gave it a quick twist with both hands. "See, it's a bit bloaty. Too watery and it breaks off too easy. But we'll have no trouble here. Lencio moved these lambs into this field after they had partly filled up so they were not hungry. If they'd come in here empty and restless I'd have bunched them for a while to keep them from filling too fast.

"And we found long ago never to irrigate while lambs are on alfalfa. Or if it should happen to rain, we may break out some dry hay to feed for a day.

"There's no use doctoring lambs once they get bloated," Clay continued. "We've tried sticking them and we've tried medicine, but if they bloat you might as well let 'em alone. If we find any bloat coming on, we immediately bunch the lambs and hold them off feed for an hour or so.

"Occasionally we find a stiff lamb caused by overeating on young alfalfa. Mixing dicalcium phosphate in loose salt and putting it out in troughs helps stop it. Our losses from all causes run about one per cent."

Cattle feeder Mack Pace of Brawley agreed that he doesn't fear alfalfa if it's mature enough. "Just so the stem is hollow, that's the gauge I go by," Pace said. "But we're tempted once in a while to use it too early. When alfalfa is young and short it's a better feed in that there is more leaf and higher protein content, but it's dangerous as far as bloat is concerned."

Each time a band is moved onto a new 40-acre field, the all-important fence has to be erected. The fence—rolls of 36-inch new wire—is unrolled. Every other post, at about 30-foot intervals, is driven into the ground with a heavy pipe knocker that fits over the post and is thumped down. The wire is anchored at each end and hooked to the posts. Then the other posts are stood up on alternate sides and the wire pulled tight in a zigzag fashion and the posts then driven in the ground.

As soon as the fields are pastured off and the lambs moved, the fence crew moves in, knocks the posts loose, rolls the wire, loads it on the truck and moves to the next field to be pastured. "These boys get so good at it that two men can put up a lamb-tight fence around a 40-acre field in less than two hours," Lencio said.

Shearing

The key to the Broadbents' shearing technique is to increase pelt and wool value by getting the job done about 60 days before the sheep are ready for market.

The lambs averaged 4 to 5 pounds of wool. This year it sold for 44 cents per pound. Sold on a live lamb it would bring 19 cents. The 20-man shearing crew charges 40 cents a head and each man shears around 100 to 150 head per day.

"Lambs do better when sheared," Clay pointed out. "Weather is getting warmer after January. Also the pelts on the lambs make a better grade, mostly U.S. No. 2, if they have a two-month growth of wool."

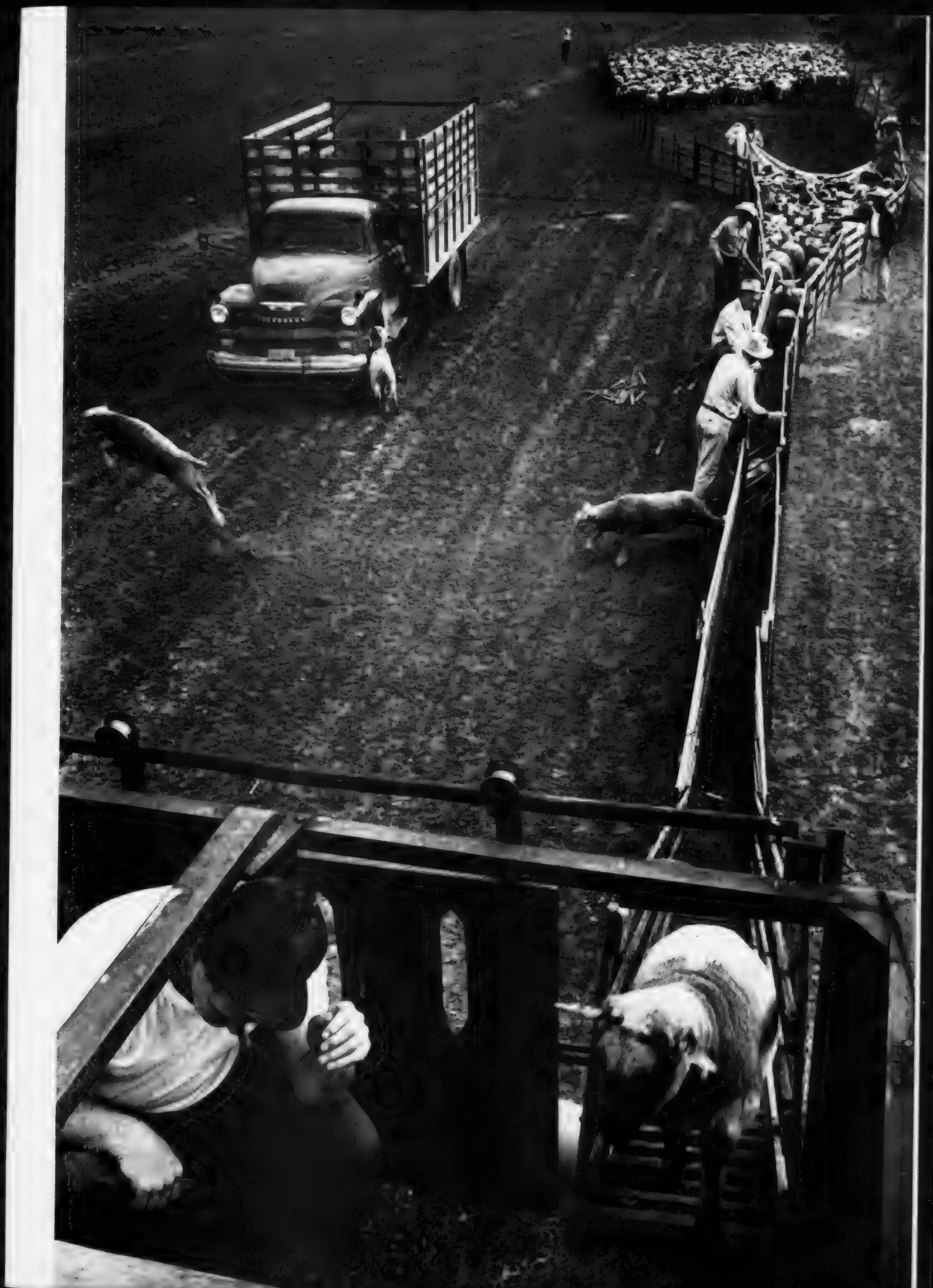
Clay Broadbent swings the cutting gate (right) as pasture-fat lambs are sorted and hustled into the truck for market. Renovation of alfalfa land (below) is an annual chore. Martin Rivera begins the job with a coil-shank cultivator and ends with irrigation. He pastures six weeks later.

Sorting For Market

From the middle of January the lambs are beginning to make the weight and grade for market demands. "Getting those lambs to market at the right weight and grade is the most important operation of the year," Clay remarked as he went about the business of sorting a band of lambs.

Just what do you look for in picking the fat lambs? Clay gave me a quizzical look and shrugged his shoulders. "It's the look of the lamb that counts. We can't take time to put our hands on each lamb and feel if he's fat. If they are filled out in back of the shoulders and flat on the top, they're fat. All I know is when I get through cutting out a load of fat lambs and send 'em to town, the packers like 'em. Anybody can tell a fat lamb. The trick is not

(*Continued on page* 132)



By Robert Carmody—Photographs by Joe Munroe

High-energy feed and superior management put on fast, economical gains and upgrade steers.

HOT FEED

YOU CAN STUFF a Strasbourg goose, but you can't force-feed a steer. As he puts on finish, his appetite falls off and it becomes harder to get him to eat enough to continue putting on economical, rapid gains. Hot feed is the solution Paul Ganz and his partner, Jimmie Hughes, use to warm up these cooling appetites. By hot feed they mean extra high energy feed—the kind that will put more feed energy into the smaller amount he *will* eat.

Though their answer to this problem may seem simple, working it out is much more complex. Feeding high energy rations definitely takes superior management. They must figure the best feed to use and know when to feed it. As the cost of the feed ingredients fluctuates at their Phoenix, Arizona, feedlot, the ration must be reformulated to keep it economical and still achieve their ends. Tall, dark-haired, quiet Paul Ganz, who looks like a studious cowboy, handles this part of the business with the advice of John W. Algeo, a consulting nutritionist from Solvang, California.

The other part of the problem, detecting the flagging appetite of cattle which have been on feed 100 days or more, is solved partly by watching the cattle with the "eye of the stockman." But with 12,000 head of cattle in the yards, and a movement of 3,000 in and 3,000 out a month, the eye of the stockman needs some help. Carefully reported feed weights and cattle weights for each pen and each lot of cattle, and miles of tape chattered out by the office computing machine give the partners a day-to-day figure on feed consumption and gains for every pen of cattle in the lot. When animals reach that critical appetite period, from 100 to 120 days after being put on feed, they are examined. "Those which are Commercial, or Good, and which you can tell by looking at them, will remain Good or Commercial no matter how much feed you pour into them, we cull out and sell right then." Paul Ganz said. "The rest go on the hot feed to step up the energy intake with less feed."

The dawn patrol (opposite page) begins the little and often feeding program which has increased feed consumption by two and a half pounds per head per day. Accurate feed weights are obtained by using a scale-truck (above) which records amounts fed to each pen of cattle.

The term hot feed grew out of the fact that John Algeo and his fellow nutritionists referred to the energy content of feed in therms. A therm is a unit used for measuring energy in the form of heat. A therm equals 1,000 Calories. The hottest feed used by Hughes and Ganz today is a 72 therm feed made up of grain (milo and barley), cottonseed meal, cottonseed hulls, alfalfa hay, molasses, minerals and fats. The fat, which is melted tallow and vegetable oils, is vitally important in stepping up the energy of the rations. Fat is figured at around 4,000 Calories per pound. Though 72 therm is the hottest feed fed by Hughes and Ganz, it is but one of four feeds graded

Fast, economical gains must be protected by careful marketing. Dressing up the pens to show uniform bunches brings the feeders the highest prices.

according to energy which the partners use to achieve their average 2.8 to 3.2 pounds of gain per day for the 150 to 160-day feeding period for the 12,000 head in the feedlot. The hotter the feed, the better the management must be to avoid the problems which go with it—ranging from bloat and founder to high gain costs.

Though these young men (they are both 34 years old) have owned their feedlot for only a little over a year, they are both old hands at the cattle business. Both majored in animal husbandry in school. After school, Jimmie Hughes, who is easygoing, a clever poker player, and a shrewd cattle dealer, turned to the marketing end of the business and became a buyer for Wilson & Co., and also a trader and feeder on his own. Paul Ganz became a cowboy after graduating from college and finally went with the All State Cattle Co. as manager of their feedlot. In February 1960 the two men recognized that they would make a good team and formed the Hughes & Ganz Corporation to buy the feedlot from All State. At that time the capacity of the lot was 4,500 head. The partners pushed an expansion program which increased capacity to 12,000 head within the year, and plan to go on to 15,000 head which they feel is as large as the present milling facilities and available land will permit them to go.

Hughes & Ganz, the corporation, owns the lot and feeds cattle for a number of different people including the partners Hughes & Ganz, who own cattle both individually and as a partnership, packers who are feeding some cattle, ranchers who want to finish out the cattle they have raised, farmers and others who want to take a flyer in cattle.

All of the cattle, whether owned by Hughes and Ganz, or by their customers, are given the same treatment when they reach the yard. They are first put on what they call their holding feed, which is alfalfa fortified with fats and minerals and a very little grain. "We try to buy a medium grade of alfalfa," Paul Ganz said. "What we want is the tail end of the second cutting and the third and fourth cutting with lots of leaf, about 15 to 17 percent protein, and about 25 percent fiber. We buy all of our alfalfa from local farmers."

Cattle just off the range will stay on this holding feed for 45 to 60 days until they begin to show some flesh on this feeding operation. Then they will be put on what Paul Ganz calls their conventional number one feed. This ration is a little over half grain—a mixture of 70 percent milo and 30 percent barley. The rest of the feed will be made up of about 15 percent alfalfa hay, 10 percent cottonseed hulls, 5 percent cottonseed meal, plus fat, molasses and mineral supplements. This, too, is a hot feed. It is rated at 67 therms.

The animals are shifted from the holding feeds to the number one conventional feed over a period of a week to 10 days, using a mixture of these two feeds as a transition. They then stay on conventional number one feed until they have been in the feedlots from 100 to 120 days. During this period they make their cheapest, fastest gains, averaging close to four pounds a day for most of this period.

"Toward the end of this period they start slacking off on their feed intake," Ganz said. "This happens at around 100 days. It's then that we have to decide whether to put them on the hot feed. Those that look like they can be raised a grade are put on the high energy feed for 30 to 60 days before they are sold."

Wherever possible, the method of feeding, as well as the feed itself, is used to put on maximum gains. The feedlot is made up of pens which range from small ones holding 60 head of cattle, to large ones which hold 250 to 300 head. In the larger pens, and in as many of the smaller pens as possible, the animals are fed a little and often—around seven or eight times a day. To do this and still keep accurate feed records, they use a feed truck whose self-unloading

The dressing-up begins in the pneumatic squeeze when animals arrive at the feedlot. Horns are tipped, switches cut square and each is given a stilbestrol implant and a shot for rednose.

body sits on a set of scales with the balancing beam in the cab with the driver. Without leaving the truck he can weigh, feed, and weigh again, and quickly record the amount of feed that was poured into the bunk. They have found that cattle fed under this system eat two to 2½ pounds more feed per day than the animals fed three times a day. The scale truck costs $12,000, but it helps them put on economical gains, and that is one of the two things they have to sell. The other, of course, is the cattle.

Salesmanship

Hughes and Ganz have a strong belief that a uniform pen of cattle brings a higher price than a mixed group. They make an effort to achieve uniformity from the day the cattle enter the feedlot. Each animal that enters the lot goes through a hydraulically operated squeeze ramp where he is branded, given a shot for rednose (rhinotrachitis), and implanted with a pellet of stilbestrol—all of this is to avoid disease and improve gains. To create the look of uniformity all horned cattle have their horns tipped to a standard short length. At the same time their tails are bobbed to give them a uniform squared-off switch. This dressing up of the product, along with careful sorting, makes for unusually uniform-looking pens to present to the buyers.

Selling takes place at the feedlots. The partners keep in constant touch with the dressed meat market as well as with the cattle prices throughout the United States. When they are ready to sell a lot they set a good price, without trying to "throw a big loop," then invite the buyers to look over the cattle and bid on them. Knowing who is on the market for which kind of cattle they can call a particular buyer's attention to the cattle he is after.

Usually a lot goes to the highest bidder, though the partners have held out in the past for better prices where they feel the local market is too low. For example, during November and the first part of December last year, eastern cattle prices had gone up, but the western market lagged behind. Hughes and Ganz held onto their cattle until the western prices came up. Cattle which have been sold are weighed at the feedlot before their first feeding.

Size

To most visitors who see, for the first time, the three big feedlots that crowd around Washington Avenue on the eastern edge of Phoenix, the first impression is one of vast

Mixing feed is a precision job. Recordkeeping doublechecks the amounts used each day and a triple check is made by laboratory testing of representative samples of feed each month.

size. They next realize that this huge acreage of holding pens is not one single feedlot, but a number of lots adjoining each other, one of which is Hughes and Ganz. To the partners size is a vitally important thing. "There are a number of different sizes, which are the right size depending on the equipment and land available," Ganz said. "It's very much like a farm—when you get the equipment you need to farm 200 acres you may find you can use it on 400 acres without additional investment. I think we, for example, are at a somewhat awkward stage of growth. With more pens we could feed 15,000 head of cattle at this lot without adding any more to our labor force of 20, or buying any new mixing, milling, or feeding equipment. That, however, would be the maximum we could go here. If we had space I would say that the next jump in feedlot size should be to around 25,000 to 30,000 head. Going down the scale I feel that a 5,000-head feedlot can be a very economical size. Here, however, the owner will have to be a good manager of labor to keep this size lot operating effectively.

"Five thousand head, I think, is the smallest efficient commercial type feedlot.

By commercial I mean the feedlot that buys all its feed and specializes in feeding. Below the 5,000-head lot the limits in size have been pretty well worked out by the universities. Up to 50 head of cattle, I believe, have been shown to be most economically fed by hand. From 50 to around 400 head are best fed with augers. From 400 on up makes a self-feeding wagon economical."

The limiting factor on the Hughes & Ganz operation in its present location is land. With the city growing closer, land prices as well as the possibility of urban restrictions act as a brake on expansion. The factor which keeps them in the 10,000 to 15,000-head bracket is the size of the mill and their storage capacity. To save on the cost of storage capacity and interest on the money invested in heavy inventories, they schedule feed delivery well in advance to keep a flow of feed coming into the yard to meet the daily demand of 150 tons.

The heavy steaming of grain illustrates the time it takes for Hughes and Ganz to put a new idea into effect. When their consultant, John Algeo, informed them that a paper had been read at the Nutrition Conference in December showing that heavily steamed grain improved digestibility, they immediately changed the operation of the mill, and before the month was out they were semi-cooking their grain.

Size also gives them maximum efficiency from labor. At the present time they are feeding at the rate of around 600 head per man employed, and will hit 750 head per man when the lot reaches its present size goal of 15,000 head. Sheer size also enables them to afford the overhead of two office workers whose major job is checking the flow of feed through the mill and into the cattle, and its transformation into good beef.

Advice to the Farmer

"What can a farmer-feeder learn from your operation?" a friend asked Paul Ganz the other day. "The most important thing I can think of is formulating efficient feeds," he replied. "Too many farmers take the attitude that the only reason for feeding cattle is to market their grain or hay, and they feed it out without too much thought as to its nutritional quality. They would do very well to buy grain and other supplements to make a good economical ration. For example, Jimmie and I bid on 750 head of cattle at what you might call shoestring prices, and we got them. They were owned by a farmer who has a barn with a capacity for 650 tons of grain and who ensiles around 9,000 tons of sorghum each year. As his grain ran out he began cutting back on grain and feeding more silage, which gave him poorer gains right at the time when he

should be getting his most economical gains. Finally, when his grain ran out he sold them for $22.50 a hundred, weighing around 525 pounds. They were a good buy for any feedlot. They were cattle that would respond well to heavy feeding. My contention is that they were just as good a bargain for their owner if he had been willing to buy grain and supplement to feed with silage.

"Another angle that a farmer might use is to feed out the roughage gains himself, say from 400 to 650 pounds and then put on the finishing gains at a reputable feedlot where he knows the operators and knows they do a good, honest job of feeding. We have one rancher with 1,200 head in the lot right now. If he had sold them when the price was down he would have gotten around 17 cents. After carrying them through the feeding period he is going to get 25 cents for his cattle. This is admittedly an unusual spread, but on the other hand when we buy cattle we are figuring a profit from them. A farmer might do well to consider selling some of his cattle and having some of them fed out in order to take advantage of the profit we see in them.

"And most important," Ganz continued, "the farmer could learn to be more cost-conscious. We hear farmers say that they are putting on 16-cent gains, and we know that they are not figuring in their own labor and other overhead expenses such as insurance, interest, gas and oil, power, and the like. We would go broke if we figured things this way. To us, the labor and overhead that goes into the cost is as precious as the grain in the feed. We have to know the cost of all the ingredients in the feed, the amount of feed it is taking to make each pound of gain, and the cost per pound of gain at each stage of the feeding period. Our two office workers run cost figures all day long. We take a physical inventory once a week and our books are audited once a month. From these records, for example, we know that by feeding a little amount quite often, we are able to put 2 to 2½ pounds more feed into the animals in the big pens than on small pens where we only feed three times a day. Our figures would show us, if we didn't know already, that our highest cost of gain comes from some of the real bloomy yearlings weighing 450 to 525 pounds, and that the cost will remain high until they get rid of that bloom; and that our lowest cost gains come from local yearlings that have been off the cow long enough to get rid of that early bloom."

Paul Ganz (left) and Jimmy Hughes celebrated their first anniversary as a partnership this spring. They have tripled the size of their feedlot during their first year of operation.

THE MIGHTY SCOUT

We sent our field man to Phoenix, Arizona, to see the unveiling of the new International Harvester Scout and to drive it over their proving grounds. We found out later our man had spent his evenings before departure reading Hiawatha to his young daughter. Apparently the rhythm is highly contagious.

Should you ask me, when you read this,
Why I write reports in meter:
I should answer, I should tell you
'Twas the engine named Comanche
Indian name, like Hiawatha
Hero of poetic legend
And a scout like International's.

Comanche is the engine's nameplate
'Neath the hood of IH Scout car
Which was builded for the Farmer,
For the Hunter and the Sportsman:
Climbing up the steepest mountains
With its four-wheel drive in low gear
Speeding o'er the Corn Belt prairies
In the standard two-drive model;
Filled with grain sacks or with duffel
And two passengers and driver.

This is Scout, Comanche driven
Quick as Wabasso, the rabbit
Handsome as the swallow, Shasha
Rugged as the native wild boar
(Indian name I seem to have not).

Choice of two cabs and a heater,
Warms the passengers and driver
When Peboan, the harsh winter
Clothes the land in ice and snowdrifts.

With a cab or with full cover
Can be truck or station wagon
Or, with either top removed
'Tis a sports car for the young ones.

With a hunter's eye we studied,
Saw its hundred inches wheelbase,
Saw its overhead valve engine
(The four-cylinder Comanche
As I told you in the first place)
With its short-stroke, big-bore pistons,
Five main bearings, valve rotators,
Thus we saw the 90-horsepower
Power plant they call Comanche.

Then they asked us if we'd care to
Drive o'er mountain, road and prairie
Freely as a man on horseback
Quickly as a sports car driven
Safely as a sure-foot pack mule
(Which is four-hoof power driven
and, like Scout, can drive in low low).
Sat we then upon the front seat
Front seat padded with foam rubber,
Turned the key and pressed the starter
Heard the engine softly murmur
Like the robin, the Opechee
To her nestlings in the evening.

With a roar the great Comanche
Answered when we pressed the pedal

Climbing up the steepest mountains
With its four-wheel drive in low gear . . .

With a cab or with full cover
Can be truck or station wagon
Or, with either top removed
'Tis a sports car for the young ones.

Laid four patches on the concrete
When we threw it into low gear
Of its synchromesh transmission.
Drove quite smoothly off the highway
(It has sturdy spring suspension)
Off the highway, crossed the range land
To the foot of a steep mountain.
Working like the beaver, Ahmeek
Climbed the steep and untrod mountain.

Then we tried one on the highway
Up a hill with six percent grade,
Thought we found it somewhat sluggish
Till we saw the hand-brake part on.
Once released, the Scout surged forward
Like a comet, the Ishkoodah
Leaped as if to meet the skyline
Topped the hill a mile a minute,
Went to 70 on the straight way
With no sound of strain or grumbling.

Then the engineers took over
On mechanical details briefed us
Spoke of torque and cubic inches,
Cubic inches of Comanche
Which are quite a few, believe us,
How each front wheel disengages
From the power shaft through free wheeling,
And of revolutions per minute
By tachometer arrived at.
And a fog rose up about us
We who look at life straightforward,
Never grasping the statistics
Never troubled by facts or figures.

Finally, we bade our farewells
To the Scout, the test track, Phoenix,
Heaved a sigh because our wallet,
Unlike that of Corn Belt farmers,
Did not match suggested prices—
Sixteen hundred for two-wheelers
For the the four-drive almost two grand
FOB and taxes added
Different tops and radio optional.

But we'll see the Scout now often,
All across the mighty nation
From the shores of Gitchee Gumee
To the portals of the sunset
Owned by farmers whom we talk to
Or by miners hunting ore lodes
Or by hunters on vacation.
And around the evening campfire
We'll regale them with our story.
How we saw the first Scout tested
Drove it fast as East Wind, Wabun
Changed its tops and revved its engine.
And we'll tell them all the details
Till their eyes close and their breathing
Changes to reverberations
Of the men who snore in boredom.

by Charles F. Rogers

Hay by the Hay Calendar

"When do you cut your hay?" we asked Wesley Wulkan of Hector, Minnesota, after a local equipment dealer had boasted of Wulkan's prowess with hay. Wulkan's reply was a smiling, "As soon as we can get to it." But the dairyman soon continued, "No, you'd better not say that. We take care to cut it before any blooms show. We try to get out in the field just as the brome grass is heading out."

Wesley Wulkan and his father, Lynn, make hay from 45 acres of alfalfa-brome on their 240-acre operation. It is all chopped hay, long-cut, finished with a fan and an oil-fired heater. They store most of it in their barn, some in a Martin Steel Haymaker, which self-feeds their 50 milking Holsteins. They have a trick, too, to help them get the hay at their choice of time. The elder Wulkan said, "Last year we went out early and cut some green chop. That delays the second cutting and we have a little longer to get spring work done and still get to the hay at the right time."

The Wulkans make good hay, as their reputation around Hector shows. The secret isn't the fan or the heater or the steel Haymaker, it's the time of cutting on the plant's calendar.

High quality hay doesn't depend on high cost equipment. It depends, more than anything else, on proper time of cutting. And for nine farmers out of ten the time to start cutting is earlier. Earlier than they have ever cut crops for hay. Earlier than last year, earlier than your neighbors, earlier than June 10, in all but the northern states along the Canadian border.

The advantages of early cutting are not found only in the quality of the end product. Grasses or legumes cut at the early stages of growth are easier to make into hay (or silage) and field losses are usually lower. Drying is more even, as the heavy stems have not appeared before budding.

The difference in usefulness of "old" and "young" forage is well shown by the milk production trials run at Cornell University, Ithaca, New York, from 1950 to 1958. In controlled experiments, cows gave 42.2 pounds per day of four percent butterfat milk when fed barn-dried hay cut June 3 and 4, compared to 34.6 pounds milk when they got field-cured hay cut June 30 and July 1. In another test with early cut hay (June 8-10) milk production was 37.7 pounds a day, a later cutting of hay (July 6-8) yielded 32.4 pounds of milk.

Prime Factor

"This date of cutting or stage of maturity is undoubtedly the most important single factor affecting quality in forage," said John E. Baylor, extension agronomist at Pennsylvania State University. Baylor, a sandy-haired forage dynamo, has long been emphasizing the advantages of proper selection of grass and legume varieties to spread the growing season so all the hay can be cut at the right time. "Obviously a farmer can't cut all his grassland in a week, even if the weather would let him. So we plan to spread the harvest season to get a greater percentage of the forage cut at its optimum stage of maturity." Baylor paused, and scooted his chair back from his desk, swung round during the ride till he was facing the filing cabinet behind him. Pulling out tables to support his statements, he went on: "You see, the later you cut a crop, the less TDN (total digestible nutrients) in the dry matter. There may actually be more TDN per acre with the mature crop, but when you consider reduced quality plus reduced intake by the animal, you've sacrificed a lot of the quality in the older crop."

Ralph Dotterer, Pennsylvania dairyman, holds a handful of alfalfa hay cut just before bloom. The time of cutting has more effect on quality and usefulness of hay than any other single factor. The right time to cut is just before bloom.

The Plant Calendar

What changes in a growing plant to alter the TDN and palatability as it matures? Basically it is the change from a young, succulent, fast-growing shoot to a tall, fibrous plant. A hay plant in the early stages of growth, before it has shown any tendency to form buds or flowers, is mostly leaves and tender, succulent stems. In this completely vegetative condition a plant has so high a protein- and so low a fiber-content, that it qualifies as a concentrate when dried.

But as the plant grows, the percentage of nutrients in its tissue change:

(1) When the plant is young the percentage of TDN in the dry matter is 65 or higher. It may reach 90 percent for forage at the pasture stage. This might be true in timothy under 12 inches.

(2) When the plant has begun to show joints, (this might be timothy 12 to 15 inches) the TDN has fallen to 60 percent.

(3) At the bud stage, when grasses have headed, and buds are visible in legumes, the TDN is about 55 percent of the dry matter.

(4) In the flowering stage, when the color of the flower shows, the TDN remains between 55 and 60 percent, but pal-

(*Continued on page* 102)

A INVESTMENT IN FARMING'S TOMORROW

On January 1, 1961, Monsanto Chemical Company committed an important part of its facilities to a long-range agricultural program. On this date the new Monsanto Agricultural Chemicals Division officially began its operations.

This new division begins with an initial multimillion-dollar investment in existing agricultural chemical plants throughout the United States. These plants make Monsanto the largest single producer of prilled ammonium nitrate fertilizer, and these same facilities have already made important contributions to livestock and poultry nutrition, and to the control of noxious weeds and grasses, brush, and insects. (Randox,® Randox T, Urea, Tri-Una-Sol,* MHA,® Santoquin,® 2, 4-D, 2, 4, 5-T, Parathion, Avadex.®)

Behind this vast production stands one of the world's greatest research organizations.

But such vital statistics, important and impressive as they are, do not reveal the true importance of Monsanto's decision to step squarely onto the farm.

After careful analysis, Monsanto deliberately has turned counter to a current trend . . . a trend *away* from agricultural research by private industry. Monsanto is affirming its faith in the long-range future of agriculture by committing a significant portion of its manpower and production facilities to agriculture *at a time when many others are withdrawing or curtailing their activities in this area.*

True, the farmer is beset with many difficulties. True, the cost of agricultural research is rising at an alarming rate. True, competition grows keener by the year. But, these factors are an irresistible challenge to the many at Monsanto whose minds and hearts are wrapped up in agriculture. These problems *will* be solved eventually because agriculture is mankind's most essential business, and will be so long as there are men and women needing food and fiber.

Discovering new agricultural chemicals will not be enough. Designing plants and making the products will not be enough. Only when these products are channeled into your hands, at a reasonable cost . . . and only after you have been shown how to use them profitably . . . will the objective of this new Agricultural Chemicals Division be fulfilled.

Obviously, Monsanto expects benefits for the company and its thousands of stockholders. It would not stay long in business otherwise. However, you too must benefit in order for Monsanto to stay in business.

In short, Monsanto is now committed and dedicated to a program of *mutual* benefit with farmers. We intend to make the association a lasting one!

*T. M., M. C. C.

MONSANTO: CHEMISTRY ON THE MOVE TO THE FUTURE

HOW TO TURN MORE REPLACEMENTS INTO PROFITABLE EGG PRODUCERS

Do this: coordinate proper feeding with protective medication through every stage — from baby chicks to laying hens.

1. Give them health in the drinking water. First immediate step for replacement chicks is AUREOMYCIN® Soluble in the drinking water for first 48 hours. This assures adequate early intake of AUREOMYCIN to guard against CRD, synovitis and blue comb. Give AUREOMYCIN Soluble at other times when disease or stress shows up.

2. Feed potentiated starter feed with Aureomycin. A PF starter containing 200 grams of AUREOMYCIN per ton is today's most effective feed. Fed for 3 to 4 weeks, this starter feed protects against CRD, synovitis, blue comb and coccidiosis — guards against vaccination reactions — gets chicks off to a fast, vigorous start.

3. Dust away Newcastle disease and bronchitis. Here's your sure way to control Newcastle disease and infectious bronchitis simultaneously. Use Cyanamid Dust BIOLATOR®, or AQUA-VAC® in the drinking water, at 1 to 7 days of age. Repeat vaccination at 3 to 4 weeks of age, 12 to 16 weeks of age, and every 4 months thereafter.

You've selected your replacement chicks for bred-in characteristics that should bring you more eggs over a longer period at less cost.

How can you be more certain that these chicks will live up to their potential and make your egg-producing operation an economic success?

By following good management and sanitation practices. By taking every precaution to see that disease is kept out of your flocks all the way through... from chick to laying hen.

Disease, visible or invisible, is the biggest handicap to making more egg money. It can strike suddenly, cause high death losses or severe slumps in production.

The Cyanamid Feed-Health Program—described step-by-step on these pages — shows you *what* to do to lick disease, *when* to do it and *how* to do it. It's a proved program — practical, sound, easy to follow.

Talk to your feed man. Ask him for your free folder which describes, in detail, the Cyanamid Feed-Health Program for layers and breeders. American Cyanamid Company, Agricultural Division, New York 20, N.Y.

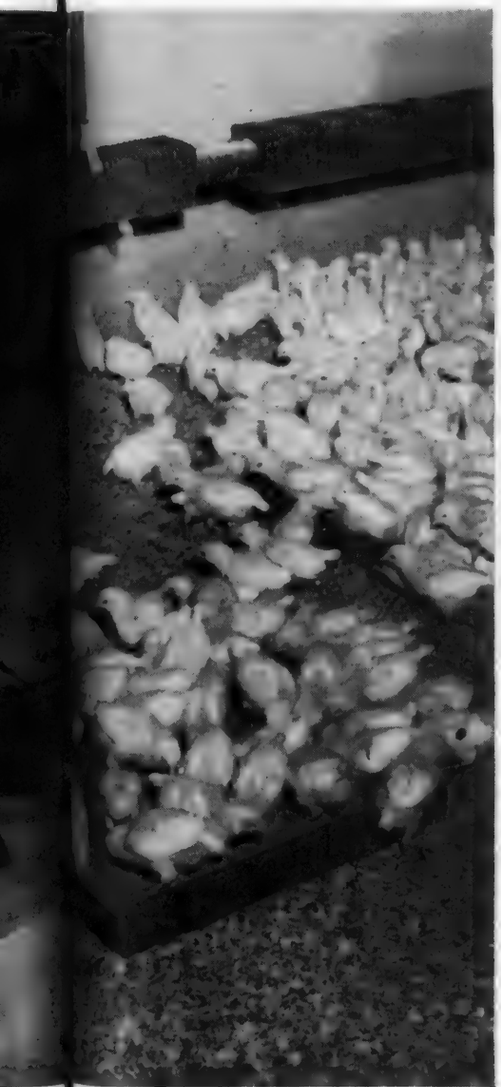
**AUREOMYCIN is American Cyanamid Company's trademark for chlortetracycline.*

The label instructions on Cyanamid products, and on products containing Cyanamid ingredients, are the result of years of research and have been accepted by Federal and/or State Governments. Always read the labels and carefully follow directions for use.

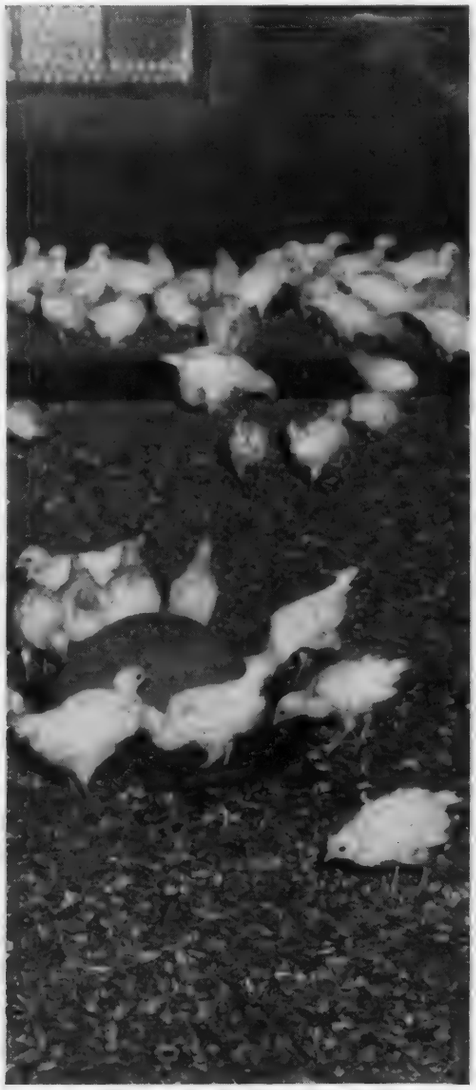
CYANAMID

COORDINATED FEED-HEALTH PROGRAM

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE



4. Keep growing chicks healthy and vigorous. At 4 weeks of age, change to grower feed with 0.02% Nitrophenide. Feed up to 12 weeks. Nitrophenide will continue to control coccidiosis and allow the development of immunity. If an outbreak occurs after 12 weeks, treat with SULMET® drinking water solution.



5. Don't risk disease setbacks later. Be prepared with a potentiated treatment feed containing 200 grams of AUREOMYCIN per ton at any time trouble shows up, including coccidiosis outbreaks. AUREOMYCIN is ideal for treatment because it effectively controls CRD, synovitis, blue comb as well as coccidiosis.

6. House more top-performing hens. When you follow this Cyanamid Feed-Health Program, you put more healthy pullets in the laying house. At the first sign of trouble—drop in feed consumption, slump in egg production or other symptoms of disease — use a feed containing AUREOMYCIN. Keep hens producing!

HAY BY THE HAY CALENDAR

(*Continued from page* 98)

atability and digestibility decline.

(5) In the seed stage the TDN may be 50 percent or less.

So, when a farmer cuts a mature crop he harvests more dry matter *but the percentage of nutrients in the dry matter is lower.*

The digestibility of these nutrients falls off fast. So in older forage, there may be more TDN per acre, but the nutrients are less concentrated, and also take longer to digest.

One of the reasons for the higher digestibility of nutrients in young crops is the higher percentage of more easily digested nutrients. Concentrated nutrients in the rumen makes for faster digestion, and more efficient use of nutrients. Animals can pack more nutrients into their stomachs in good hay than in passable hay, and have less need for costly purchased concentrates.

A second reason for the increased rate of digestion of the younger plant is the low fiber content. Old plants with high fiber content digest slowly because the fiber itself is slow to break down, and because it keeps rumen organisms from reaching the more easily digested carbohydrates and proteins. Speed of digestion is important because it means the animal can eat more total nutrients, making more available for meat or milk production.

As the season progresses, a grass or legume crop matures. The dry matter per acre increases, the TDN per acre rises, but TDN in the dry matter falls, along with digestibility and palatability.

The best time to cut is some days before bloom, in most grasses and legumes. If you harvest before budding, you lose TDN and valuable tonnage, and so the growing and harvesting costs of a unit of TDN are too high. If you harvest too late, the cost per unit of TDN is less, but the rumen makes less efficient use of the TDN in an old crop. The ratio of leaf to stem is high in early-cut forage, and legume leaves are high in minerals, especially calcium and phosphorus.

There are other costs in harvesting an old crop of forage. The mature crop will suffer more from weather. Early-cut forage can lie longer in the swath, even suffer rain, and still make good hay. The same treatment will ruin more mature cuttings.

Mechanical losses at harvest are greater in an old crop because the leaves dry quicker than the stems, and so are overdry when the stems are dry enough to store. The leaves shatter in handling.

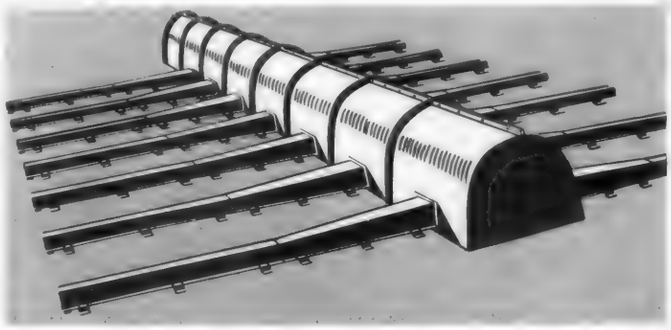
Crimping or crushing or flail-type choppers will materially speed drying time for either young or old crops, but they won't eliminate the disadvantages of the mature forage. Young stems still have the ability to breathe. Older stems have lost this property, and so dry slower. Even though young crops have more moisture per pound than mature crops, they lose it faster.

If you cut too early, you reduce total yield for that cutting, and you may also reduce the total season's yield by stunting the crop. "No question, you can kill legumes by cutting too early," said Ralph E. Dotterer, Lamar, Pennsylvania dairyman, who farms with his brother, Earl C. "If you cut alfalfa that's under a foot high it has a hard time coming back. We get 'round it this way. The first grass we cut is what we'll plow down for corn anyway. It gives us a little longer cutting season. I'll admit our corn goes in after our neighbors', sometimes it's altogether too late for grain. However, we use a late variety, and still get top-quality silage.

"We don't go by all the rules the experts give," continued this busy dairyman. "We get four or five cuttings a year, the first one at the last of May. Heavy fertilization is the key to good forage production.

"We spread the harvest still more, with varieties that mature at different dates," he said. "We've used Vernal and DuPuits alfalfa, but some of the fields are still in Buffalo and Ranger. They're nine years old and were planted before Vernal came out. Now we're going to try some Pennlate orchard grass. It's supposed to be better than S37, which we've used in the past. Usually we let a field get to bloom at least once a year, or the stand weakens. Like I say, we break some of the rules, some purposely, and some otherwise," he said, and pointed at his plump, rounded milkers. "But those are some of our thin cows." He grinned.

CURE HAY WITH A LOUDEN "HI-DRI" HAY DRIER *and feed all the nutrients you grow*



Green leaves contain 70% of the protein and 90% of the carotene found in hay. When you cure with a Louden Hi-Dri you save practically all of the leaves. This means you retain most of the hay's original nutritive value. And because you save most of the nutrients, you can reduce concentrate and supplement feeding. *The Hi-Dri can pay for itself in one season!*

Your Louden Hi-Dri will thoroughly dry hay with complete safety. A constant stream of air flows through smooth, streamlined ducts. There are no rough corners or obstructions on the Hi-Dri to prevent the even air flow. Propeller-type fan has lower initial cost, gives greater operating efficiency per kilowatt hour consumed.

For complete information on how Louden's Hi-Dri Hay Drier can help you, mail the coupon today. There's no obligation.

The Louden MACHINERY COMPANY

325 North Court Street, Fairfield, Iowa
Branch: Dept. 1-325, Albany, New York

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Buy your water system pump on capacity and pressure – not horsepower. You will find the Red Jacket Custom "Submerga" Pump gives you "more water for less money." Owners find they can get the water they need from smaller horsepower pumps to gain both big first savings and continued savings in electricity. Combine this high capacity with the proven dependability of Red Jacket "Submerga" Pumps and they are the biggest water system bargain you can get. Ask your Red Jacket dealer what size you need.

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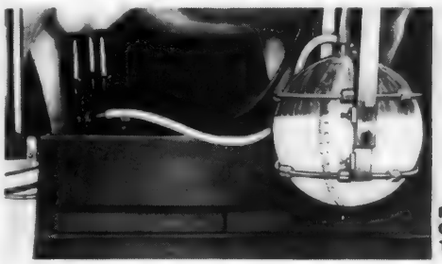
RED JACKET MANUFACTURING CO.
Davenport, Iowa

CHORE-BOY ANNOUNCES

Important New Developments in MILKING and FEEDING

NEW, IMPROVED *Roll-O-Measure*

SHOWS EXACTLY HOW MUCH MILK EACH COW PRODUCES AT EVERY MILKING —



The rigidly-supported, calibrated glass sphere shows exact production of each cow. Cleans-in-place.

New device provides true sample for fat test. Vacuum reserve near udder for faster, better milking.

NEW ALL-GLASS *Roll-O-Clean* RELEASER

THE ONLY SPHERICAL GLASS RELEASER

With the addition of the new glass dumping chamber, milk is always visible until it enters the tank. The entire system is cleaned-in-place. Releaser arm swings to wash sink for washing.

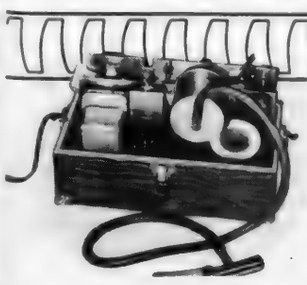
NEW "SELF-DRAINING" VACUUM CONTROL CABINET

This stainless steel cabinet houses the releaser-pulsator, air injector and the new self-draining moisture trap. It also contains the vacuum-controls, which are sealed. A broken seal indicates tampering.

NEW AUTOMATIC WASHER — "IT'S A JEWEL"

This is the simplest, most dependable automatic washer on the market. Recent improvements and simplifications have resulted in a lower price. A turn of the control handles the entire washing operation—rinsing, the long wash and final sanitizing — without further attention. One small electric motor provides the power.

NEW CHORE-BOY LACTOGRAPH



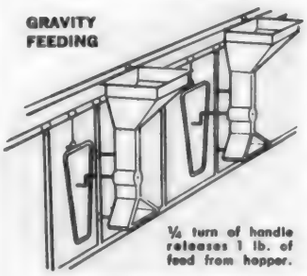
The Lactograph, developed by Chore-Boy, contains a set of instruments which scientifically test the efficiency of a pipeline milking system. Included in the kit is a vacuum recorder which records the pulsation cycle on a tape. (A sample of the tape is shown above). Chore-Boy dealers are now being provided with the new Lactograph instruments.

CHORE-BOY "NON-BRIDGING" BULK FEED STORAGE BIN

A rotating bottom of linked steel prevents the feed from "bridging" inside the bin. A flexible auger (shown right) moves feed around corners. One motor operates system. In three sizes — 3½, 5½ and 7½ tons.

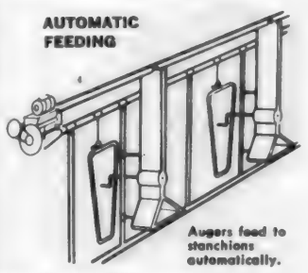
STANCHION FEEDING SYSTEMS SAVE TIME

GRAVITY FEEDING



¼ turn of handle releases 1 lb. of feed from hopper.

AUTOMATIC FEEDING



Augers feed to stanchions automatically.

NEW, IMPROVED CHORE-BOY LACTORIUM

Chore-Boy's new Lactorium has 25 improvements. It's durable, well insulated, dry. Delivered from our factory, ready for operation in a short time. Equipped with a Herringbone Pipeline Milking System. Hundreds of Chore-Boy Lactoriums are in use throughout 18 states.

CHORE-BOY *LOW-VACUUM* **MILKING SYSTEMS**

USE CHORE-BOY'S PURCHASE PLAN

With our new Purchase Plan you can be using your milking equipment while it pays for itself.

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500's and shorter 600's use this truck and raising arm

Ram is constantly filled with oil. Doesn't rob tractor oil.

Standard, All-Ways-Balanced trucks come in five sizes.

New, low-cost truck with hand winch fits 500's up to 42'

With Kewanee trucks elevator is in balance at any angle

Here's What a Man Wants in a Fine ELEVATOR

New! Featherlight Flip-Up hopper! Only 7 lb. lifts it!

In transport position hopper is held parallel by springs.

New neat design. No obstructions! No strain on trough.

New hopper is low and wide. Geared to elevator capacity

Greatest Elevators of All Time!

■ Nowhere, no nowhere but from Kewanee can you get such fine elevators and such a great selection of troughs, trucks, elevating mechanisms, accessories and refinements.

Look them over! There's an easy-to-handle, long lasting, large, small or medium-sized Kewanee to meet your requirements whatever the needs of your farm may be.

Three different types of trucks to choose from: the new hydraulic . . . what a convenience! . . . raise or lower from the tractor seat . . . three sizes . . . smaller ones fit 500's up to 50′ and the smaller 600's . . . larger one for big 600's up to 64′. Then there are the well-known Kewanee standard trucks . . . five sizes . . . for all 500's and 600's . . . mechanical or power raise-and-lower with PTO, gas or electric. And last but not least there's the new, low-cost truck for 500's up to 42′ . . . hand winch raising.

And on any of these elevators you can have the brand new Featherlight-Flip-Up-All-Ways-Balanced hopper the finest hopper ever made.

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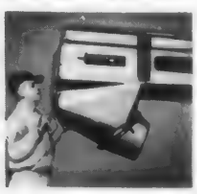
Hydraulic Truck
Three sizes to choose from
Smooth raise-or-lower from tractor seat
Trough is solidly supported
Works with hydraulic system of any tractor.

Standard Truck
Five sizes to choose from
Raise with power (gas, electric or PTO)
Balanced at all elevator angles
For troughs from 20′ to 62′

Low-Cost Truck
For 500's only
Fits bale type to 36′, with hopper to 42′
Safety hand winch raising and lowering
Ideal for small cribs and mows.

Developed, tested and approved by farmers for farmers.

Detachable head hopper comes off with removal of one rod.



Easy to get ready to load hay. Just remove head crown.

Power raise-and-lower (on standard trucks) with PTO from the tractor seat. You can also raise-and-lower with gas or electric.

Ball bearing spout ring is smooth in operation. Rugged

Ti-Co galvanized sheet steel is tough, resists rust.

John Baylor explained the use of varieties to spread the cutting season. "Tests in several plots scattered over Pennsylvania showed these average feed values for several legume and grass varieties, when harvested at three different dates:

Date of cutting	*TDN in Dry Matter*
May 15	68.7 percent
May 29	60.3 percent
June 12	55.5 percent

"This is a decline of about half of one percent a day of TDN in the dry weight of the forage, based on the Penn State system of forage valuation. Now, understand, in southeast Pennsylvania, on May 15, DuPuits alfalfa was ready to cut, and in the northeast it was still prebloom. The various varieties reached the same nutritive stage about 10 days later in the north. Now to compare species and varieties, by averaging the values for each variety at all locations and all dates of cutting, we get averages of:

	TDN in Dry Matter
DuPuits Alfalfa	63 percent
Vernal Alfalfa	66 percent
Viking Birdsfoot Trefoil	69 percent

"In other words, with about a half-percent loss of TDN per day, Vernal is six days behind DuPuits, and Viking is about six days behind Vernal. The same TDN in dry matter spread showed up with grasses:

	TDN in Dry Matter
Potomac Orchard Grass	56.5 percent
Lincoln Brome	56.5 percent
Pennlate Orchard Grass	58.0 percent
Common Timothy	60.5 percent
Climax Timothy	61.0 percent

"Now, we know Pennlate flowers six days days after Potomac orchard grass. But its peak of nutritive value appears to be only four days later. And again, Climax flowers several days after common timothy, but it would show it about a day later on a nutritive scale.

"This is only preliminary work; there isn't any doubt we need to learn more about both calendar and 'nutritive maturity.' I think the answer is going to lie somewhere between cutting by the calendar and by stage of growth.

"These tests show that the early orchard grasses mature too soon to be compatible with DuPuits, for instance, for hay or silage in Central Pennsylvania. Suppose you wanted to harvest 40 acres of hay. It could be: 6 acres DuPuits alfalfa and common timothy, or DuPuits and S37 orchard grass; 14 acres Vernal (or Buffalo or Ranger or Atlantic or Narragansett alfalfa with Pennlate or S37 orchard grass or Climax timothy); 14 acres Viking birdsfoot trefoil (or any hay-type birdsfoot trefoil) with Climax or Essex timothy; 6 acres of red clover and common or Climax timothy."

Spreading the hay-making season may not be the answer for every farmer, or all over the country. A farmer with a small hay crop may want to finish it quickly during the busy spring planting season. It is often better to cut hay at the right time, rain or shine, than to let it mature while you wait

FIELD BROME

An outstanding winter annual cover crop that can be seeded at the last cultivation of corn or in rowed soybeans. Also excellent cover for open ground or in orchards. Will make late fall and early spring pasture, if moisture is favorable. Root system is much more extensive than rye or rye grasses. Winter hardy, establishes readily. Seed 10-12 pounds per acre.

40 lbs. $13.25 plus postage—100 lbs. and over $.32 per lb. FOB

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Now chop clean and fast with this

NEW BEAR CAT CHOP-MASTER

Here's a BIG capacity Chopper and Shredder that cuts green feed either standing or windrowed for green chop feeding or for ensilage. Handles nearly all kinds of grasses and forage in most any condition of tangle or moisture. This new CHOP-MASTER, like several other harvesters, uses the flail-type patent proved best for this kind of work. However—the CHOP-MASTER has 15 points of *superior* construction that makes it as outstanding as the Bear Cat Grinder is in its own field. A FREE bulletin shows all these CHOP-MASTER advantages. Send for this bulletin before you decide on what chopper to buy.

CUTS A BIG FULL SIX-FOOT SWATH

- Cuts green feed
- Cuts grass silage
- Shreds and spreads stalks
- Mows weeds
- Tops beets, potatoes
- . . . Plus many other jobs

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Quarterly PHOTO REPORT

What's New on Progressive Farms

3 New E-X-P-A-N-D-A-B-L-E Buildings

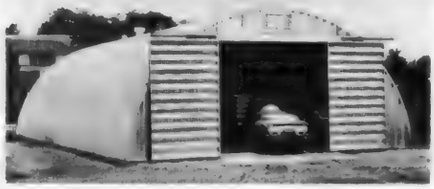
"Low-cost," weather-tight protection is yours with any of these 3 new buildings. All made by Behlen Mfg. Co., of Columbus, Nebr., they are built of extra heavy gauge deep-corrugated steel for greater strength.

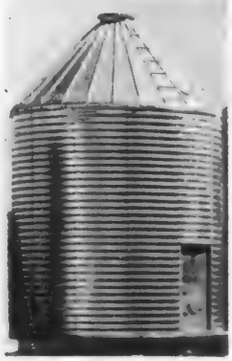
The new Behlen Town & Country (above) comes in 35' x 20' units, which may be put up individually, or which may be coupled together to form one large building. Selection of door and window sizes. 10' or 14' ceilings.

Behlen's Curvet (right, top) is built to store grain and/or machinery at the same time. Comes in 40' and 53' widths. Has single or twin walls. Length is unlimited.

Behlen Straightwall (right, bottom) stores bumper crops and at the same time parks biggest implements. Comes 39' or 52' wide. Either 16° or 30° roof.

All 3 new buildings rated: Superior.

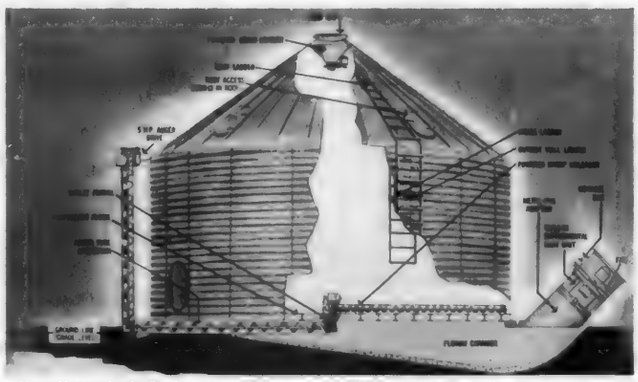




New Grain Tanks

Behlen Mfg. Co. announces new heavy-gauge "Eave - Seal" Tanks. 12 sizes (950 to 15,000 bu.). Four diameters (12' 15', 22', and 26'). OK'd to fill to peak.

Rated: Strongest.



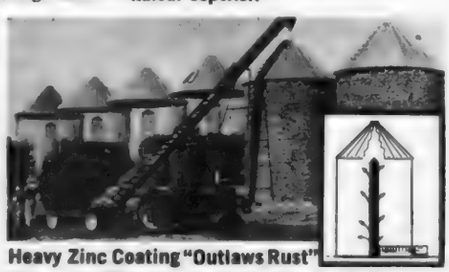
New Natural Air Drying Tank Dries up to 2,900 bu. 30% Grain at a Batch

New low-cost natural air drying tank has been perfected that takes all guesswork out of drying. Made by Behlen Mfg. Co., Columbus, Neb., this new tank forces up to 35,000 cu. ft. of drying air through the entire batch every minute ... Behlen's exclusive Static Pressure Gauge measures air flow. Supplemental heat unit (optional) cuts in only when needed. Dries and stores all grains. Has automatic unloading equipment. New eave design ("Eave-Seal") is weather and grain tight ... so strong and sturdy you can fill to the peak.

Rated: Superior.

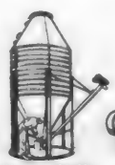
Dry 500 bu. of 30% Grain in 2½ Hours

Behlen Batch-Type Grain Dryers force up to 78 cubic feet of heat-charged, drying air through every bushel of grain every minute ... dry 500-bu. of 30% grain in 2½ hours. PTO or electricity ... LP or Natural gas. In 270, 375, 500, 750-bu. sizes.



Heavy Zinc Coating "Outlaws Rust"

There's a lifetime of service in these No. 2 gauge steel Behlen Corn Cribs. Every barmesh is dipped in zinc *after* welding. All steel surfaces *including weld spots* are covered with up to 6 times the normal amount of zinc. These "Steep Pitch" cribs fill to the peak. Always stay in round. From 611 to 1940 bu.

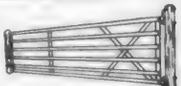


Hopper-Matic Bulk Feed Tanks

Heat Blowers

Vent and Tunnels

Crop Drying Fans



Farm Gates

Write for full information, dealer's name:

BEHLEN MANUFACTURING COMPANY

Dept. F-5 Columbus, Nebraska Phone LO 4-3111

Behlen

for the best possible haying weather.

The crops needed to spread the hay season vary widely, even within small areas. In Missouri, for instance, dates of grasses reaching first heads are: orchard grass, May 1 to 10; brome grass, May 10 to 20; timothy (common), May 25 to June 1.

Legumes reach first blooms: imported birdsfoot trefoil, May 5 to 15; red clover, May 10 to 20; alfalfa, May 15 to 20; Empire birdsfoot trefoil; June 1 to 10. There is considerable variation from year to year, especially in the grasses.

In California's San Joaquin Valley, to have hay ready to harvest at different times they might plan like this: 20 acres Lanhontan alfalfa. First cutting to go into silage, cut March 15th to April 1. Other cuttings baled. 10 acres ladino clover and orchard grass, pastured until August then one cutting of coarser hay for feeding dry cows during winter. 10 acres barley or oats with vetch to be cut in late June or July 1, for steers or young stock coming onto full feed of grain. The cereal and vetch hay is good to get cattle on feed.

Getting to the hay field at the optimum time is easier done on paper than on farms. One big help is to be able to switch from hay to silage. "We cut hay with the weather," said John Russell, a young dairy farmer of Warriors Mark, Pennsylvania. "There's an awful lot of difference in just a couple of weeks. When the weather lets the crop get ahead of me I put up some silage. It takes less time and lets me finish a cutting at the right time."

Russell makes grass silage in one of his two 100-ton Silver Shield steel silos, corn silage in the other. Part of the grass silage was orchard grass and ladino clover, but most was Vernal alfalfa and common timothy. "We like the Vernal," said Russell. "Ranger is too stemmy and DuPuits just doesn't get big enough.

"We're usually done with our first cutting when a lot of guys are getting started. But I like to let one cutting go to full bloom. We don't usually plan it; it seems when you get to the last of a cutting that part's in bloom."

His grass silage and hay quality is unquestionably high—certainly the 34 milking Holsteins enjoy it to the tune of a 13,000-pound herd average with 436 pounds of butterfat. (This in spite of almost a dozen first calf heifers in the herd.)

"The land needs fertilizing when you take a lot of hay off it," said Russell. "Last year we put on 400 pounds of 0-30-30 in the fall. And I try to topdress after the first cutting with 250 to 300 pounds of 0-20-20."

This quiet, soft-voiced young dairyman has a forage test on his hay every year. "It gives us a good idea what we're doing," he said, "but the most important test is that *they* like early-cut hay." And he pushed some more hay within the reach of the "they" in question—his cattle.

THE AUTHOR: Charles F. Rogers has been in agricultural research work for 34 years. His specialty, hay and silage. He has recently shifted from experiment station work to consultation and is retained as consultant by a number of companies producing for agriculture.

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That Really Produces

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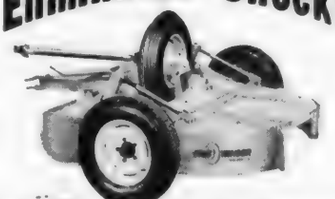
SIDE WINDER ROTARY CUTTER

HAY CUTTING FEATURE STANDARD EQUIPMENT

Patented Spinning Tire Drive

Eliminates Shock!



JUMPS STUMPS!

Side-Winder, pioneer of hay cutting feature as standard equipment, has engineered the S/W model to do a better hay cutting job under all conditions. Eliminates conditioner and rake in most instances. One operator, one machine doing all jobs. Permits baling sooner at a saving of money. Also cuts brush, briars, stalks, etc. Manufacturers of the most complete line of rotary cutters.

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NO SUMMER DORMANCY

(*Continued from page* 61)

up about six weeks later. If he wants to use the pasture again next year, he helps it along with 200 to 300 pounds of ammonium nitrate after he takes the cattle off.

Does Daugherty think keeping that close a check on mere grass is worthwhile?

"It certainly is," he said. "Generally I check only five plants—one from the middle of the meadow and one from each corner. You might say I've developed an eye for picking representative plants. I am certain I made as much money from eleven acres of timothy as from any other eleven acres on the place."

How does he calculate that? "Let's set a few figures down right now," he said. "I grossed $1,104 from milk in May. We fed hay all the time the cows were on pasture. This averaged to 11 or 12 pounds per head each day. At a penny a pound that would add up to $96 for hay we should subtract from my gross. Then take concentrates. We feed at the rate of one for three, or about $240 worth for the month. Let's subtract $200 for fertilizer. That's a high estimate. This leaves a net income from milk of $568 for the field, or better than $51 per acre in May alone. In a good year I net about $56 per acre on corn—but that's for the whole year! Now you economists will say—'hold on, aren't you going to figure labor?' Well, you could make quite an allowance for labor, and the pasture would still come out ahead of the corn. Corn takes a lot of field work. I have to milk cows twice a day whether they graze scrubby pasture on a hill someplace or whether they get good grass. I'm convinced I'm ahead if they get good pasture from good land."

Two Types of Grass

Bill Daugherty understands the principles behind his frequent excursions into his pastures armed with a knife. He prefers, however, that people who get interested in this unusual chore check with his own teacher.

The Purdue professor is used to explaining pasture principles. He papers the walls of his office with diagrams, charts and drawings of grasses, and he is out weekly giving lectures to farmers. The enthusiasm he shows his office visitors and farm lecture audiences is so infectious you're convinced he has something great to say before he has spoken two sentences.

Early in his career Dr. Teel got the idea that pastures would be more valuable if more were known about grasses. He recognized two types of grasses that differ in the way they grow. This fact in turn affects the way they should be managed.

The shoots of the first type make their stem growth in segments called joints. Joints are separated by nodes which show well on corn as hardened rings on the stems. You can also find them on mature stems of timothy and other pasture grasses of the jointing type. These include brome grass, reed canary grass, Sudan grass, Johnson grass, and the sorghums as well as the cereal grasses, wheat, oats and barley.

Pump Talk *by Deming*

QUIZ TIME

Do you know how to estimate daily water needs?

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In young shoots you can find all the undeveloped stem joints in a compact zone near the soil surface. This zone is called the growing point. It resembles a compressed telescope in the way the joints unfold. Imagine that you pulled out one segment of a telescope and held the unfolded segments up. If you were to break off the top and throw it away you'd be eliminating the possibility of all further expansion. Similarly, in a jointing grass as the lowest joint completes growth, the undeveloped segments are pushed up to a vulnerable height. If you graze or mow below the growing point, you stop the shoot from further growth. It is best to save the growing point until it develops a young seedhead and pushes it well up into the shoot.

Destroying the growing point early doesn't necessarily kill the grass, but always weakens it. Although the first shoot is dead, the plant can recover from buds in the crown of the roots if there is enough moisture. These buds are poorly developed. It takes a week or two before they become new shoots with new roots. So temporary dormancy is sure even under good growing conditions, if the growing point is cut off early. Under dry conditions, dormancy lasts even longer. These facts led to Daugherty's watching the growing points or the buds in the root crown of timothy pasture.

The first few days of pasturing young shoots are not critical because their growing points are too low to be damaged. Aboveground growth consists of leaf blades attached to the stem beneath the growing point. It is only after the first stem segment grows out, raising the leaf bases and undeveloped stem segments above the soil surface, that it becomes important to watch how low you graze.

Grazing Too Late

"Saving the growing point during early grazing is important," Dr. Teel said. "It is equally important to graze as soon as the growing point has developed its jointed stem. You can tell this stage by the fact that the seedhead emerges from the top of the shoot. It marks the time when buds are naturally ready to produce a second shoot. The way a jointing grass grows, the new shoot stops growing from the time its tip breaks the soil until the seedhead on the old shoot sheds its pollen. One of the wisest things a cattleman can do is to clip undergrazed pastures to prevent grasses from heading. This gives new shoots an early start. Delay in hay harvest, or failure to clip undergrazed pasture until after grasses head out again, is likely to cause summer dormancy because drouth hits new shoots before they are far along.

"That's not all. You suffer further by losing feed value from late-cut grass. After the seedhead emerges, grass gets stemmy and unpalatable. If you can't destroy seedheads by grazing, clipping will promote better grass quality. Clipped grass left in the field at this stage, makes better feed than standing shoots with maturing seedheads. So there's a double-barreled reason for watching the development of the growing point and the buds on the root crown: feed value of the present crop and good growth of the following crop.

"In immature shoots you can identify the growing point easily by the tiny seedhead above the uppermost node," Dr. Teel went on. "The seedhead is about a quarter-inch long at the time you should start worrying about grazing too low. Daugherty was able to use this method on both the first and second shoots because timothy has a seedhead on both. Other jointing pasture grasses, brome, for example, have seedheads only on the first crop of shoots."

You'll probably need bifocals if you're past forty to find a growing point without a seedhead. Your guide is smaller and smaller segments or joints in the stem. Above them is a dark-green zone with unexpanded segments plus the light-green plume of a tiny young leaf.

Non-Jointing Grasses

The second type of grass growth Dr. Teel tells about is non-jointing. Bluegrass is an example. Generally the growing point of non-jointing grasses stays at the ground level or below. Animals can pasture only leaf blades growing from it. Regrowth is from the cut end of the stubble. That is why bluegrass pasture or lawns can stand

"WHY DIDN'T ANYONE THINK OF THIS BEFORE?"

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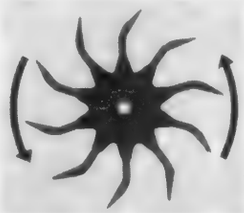

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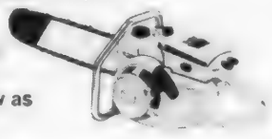

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frequent clipping fairly close to the ground without going into dormancy.

Non-jointing grass has no true stem. Fleshy leaf sheaths, one inside the other, form what looks like a stem. There is one exception which the farmer interested only in grazing or making hay can usually ignore. Grasses like bluegrass do form some shoots with seedheads. These shoots are no different from those of a jointed grass. But if they are cut or grazed off, pasture growth as a whole is not set back because there are relatively few flowering shoots. The main difference between the two types of grasses is that non-jointing species have predominantly non-flowering shoots, none of which have segmented stems. Their growing point stays low. Jointing grasses produced segmented stems both on shoots with seedheads and shoots without.

Orchard grass, tall fescue, redtop and bent grass are non-jointing grasses like bluegrass and can be grazed frequently and fairly close to the ground. Despite the fact their growing point is underground it still must be protected. In summer, if the grass is rested until the sheaths grow long, close grazing or clipping removes most of the leaf blades, leaving only cut leaf sheaths as stubble. This is harmful since water is drawn into grass roots and past the growing point only as long as there is plenty of blade surface for evaporating water from the plants.

The effect is the same as when drinking through a straw. The minute you stop sucking, the cider stops coming out of the straw. With leaf blades gone and no longer "sucking," the growing point may get too dry and the shoot will die. This is Dr. Teel's explanation of summer dormancy in non-jointing grasses.

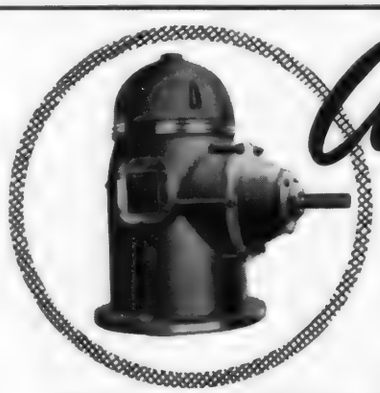
Bill Daugherty takes advantage of this theory. For this year he has seeded an orchard grass and a brome grass meadow with some alfalfa and a little ladino clover in each. Since orchard grass is of the non-jointing type, he won't have to worry about aboveground growing points. He will try instead to bear down heavily on orchard grass to prevent leaf sheaths from getting too long. He plans to graze frequently—always leaving three to four inches of stubble. This way enough leaf area will remain for adequate evaporation.

Possible Problems

As Dr. Teel tells his classes, it takes more than a sharp knife to manage pasture properly. Daugherty had one hard decision to make based on what he dug up with his knife last year.

"When the time came to pasture the second shoot," he remembered, "I wished I had another species of grass to turn to. There hadn't been quite enough growth and I knew if I went ahead and pastured then, I wouldn't get the deep-rootedness I'd want. This would hold back the third shoots from lack of moisture. It would have been better if I let the second shoots grow about 6 or 7 weeks and only pastured once—when the third shoots were ready to come up. But I had no ready alternative, so I pastured the second shoots twice. Sure enough, when I needed to pasture the third shoots, there wasn't much regrowth. So I let the cows take the third growth to the roots. After that I stopped grazing the timothy and used the aftermath of the hayfields for pasture. I had plenty of grass for them there and I decided to plow the timothy up for corn this year. I didn't worry whether or not the timothy came back before winter."

Even simplified versions of the management Dr. Teel promotes can go awry if used carelessly. He illustrated this with the experience of a farmer he knows. Dr. Teel said: "This cattleman told me he'd bypass looking for growing points by rotating livestock between several pastures, and regrazing only when the buds of the next shoots were sprouting. In July this farmer phoned to say something had gone wrong. One of his pastures had turned brown while across



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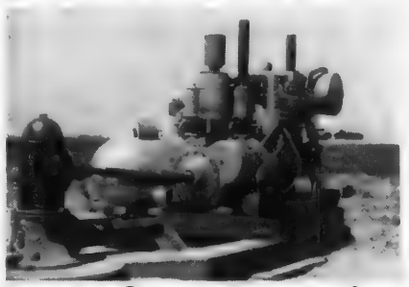

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the fence everything was green. The trouble was, he waited too long to graze the first growth. You must use soil moisture in June to grow new shoots—not old seedheads."

A farmer who tried Dr. Teel's high fertility and closely managed grazing program on a two-acre test plot saw another problem. He is Kenneth Case of Cayuga, New York, who cooperated with his extension agent in setting up a demonstration of brome grass management.

"The one disadvantage of an early first cut," Case said this spring, "is that around here it means you have no choice but to wilt grass in the field if you're going to put it in the silo. But in general I think the demonstration proved that this type of grass management can be profitable."

Case added that one thing he wasn't sure about, was how to find the growing point. When Dr. Teel heard about that, he said, "It isn't hard once you try it a couple of times. You don't necessarily have to slice shoots with a knife. A blind student of mine came up with another idea. He said he took a hand scythe and cut several patches from the edge of a meadow every other day. When he could feel the soft tufts of regrowth, he knew he had cut above the growing point. When he touched only hard stubble, he knew he had cut below it.

"Actually, you can make too much of mechanics," Dr. Teel said. "Your real goal is getting the most high-quality grass possible, and your method is management. The important points are:

1) If you pasture, try for two grazings from each shoot of a jointing grass such as brome or timothy. Take the first cut above the growing point and the second below.

2) Destroy seedheads no later than when tillers of the second shoots appear. This applies particularly when you take the first cut for hay. You may get a lower yield, but you're certain of a higher-quality crop. You'll get more regrowth from available fertility and moisture. For the most regrowth, spread extra nitrogen as soon as you clip off the seedheads to stimulate growth from buds in the root crown.

3) After about five weeks' growth, the second shoots have lifted their growing points about four inches off the ground. If you harvest then, cut above the growing point. Otherwise, wait until tillers of the third shoots form. Either way, you'll get grass in late summer when many meadows are dormant from mismanagement.

4) In a non-jointing grass, pasture often, but don't graze off all green leaves. You avoid killing off most of the shoots by keeping water flowing through them.

"The whole secret to pasture management," Dr. Teel concluded, "is not interrupting growth. In jointed grasses you keep either an existing shoot or a new shoot growing. In a non-jointed grass you maintain the food and water supply to the growing point by not cutting off all the leaf blades. It is as simple as that."

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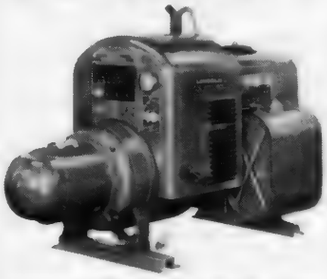

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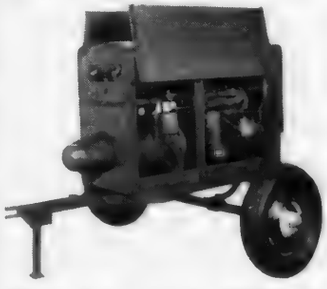

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DING DONG DADDIES

(*Continued from page* 71)

owned elevator and the one at Etter has given the farmers of the county adequate and timely service under all normal conditions."

Feeders can use the co-op as a grain bank to hold their supplies and deliver them on call, or they can cover their needs by direct purchase.

A Night's Lodging

During the decade of the 1940's Dumas held the title of "Fastest Growing Town in Texas." Its natural gas and oil deposits brought over a score of big industries to the county, all of them connected with the extraction or processing of these underground riches. And all of the personnel connected with the construction and operation of these plants converged on the county seat. The two small motels and the two antiquated hotels located over some stores in the business section were completely inadequate to serve these travelers and prospective residents who flocked into Dumas.

The Ding-Dong Daddies might have adopted Robert Toombs' attitude. Toombs, a Georgian, was Secretary of State of the Confederacy. The story is told that some of the citizens of his hometown got the idea they would like to build a hotel. Toombs opposed the project. When asked why, he replied, "If the traveler is a gentleman, he can be a guest in my home. If he isn't, we don't want him in town overnight."

But even if the good folks of Dumas had been willing to play host to their visitors, the job was much too large.

"Five of us got together over a cup of coffee one morning and decided something had to be done," says Jesse Cooper, who shortly after that coffee session found himself chairman of a committee to raise funds for a new hotel. Cooper is a rotund, balding, ex-flight instructor of World War II days. He farms some 6,000 acres of land in the northern part of Moore County, is one of the owners of the Etter Grain Company, an elevator on the Moore-Sherman County line, and still flies his own plane with all the skill of an old pro. He is one of Moore County's most enthusiastic boosters and to anyone who listens to him for as long as 90 seconds it becomes apparent why he was chosen to put across the hotel idea.

The drive started in 1949. "The meat in the coconut was that we needed accommodations for travelers, and we needed banquet space and meeting rooms as well," Cooper says. "Some of us had seen the Dale Hotel, which was completed about that time up at Guymon, and we decided that was just about what we needed here.

"We got the Hockenberry people (a firm specializing in fund-raising drives of this type) in here to give us some help, got a state charter and began selling stock for the proposed hotel in $100 shares."

A 12-man executive committee was set up with Lee Haile, general manager of the Sneed Ranches in the southern part of the county, as chairman. Each of the committee

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Cattle, swine and sheep grow faster when rations are supplemented with dehydrated alfalfa. Using a Heil dehydrator, all the field-freshness and nutrition of alfalfa is saved . . . you feed more protein, vitamin A and other essential growth elements. What's more, you eliminate leaf-shattering and weather loss, often getting an extra cutting so you can reduce your feeding costs. Get all the details . . . send coupon now.

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Please send information. My farm has..... acres of forage crops.

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PILOT BRAND pays off at the market. This ideal eggshell material helps you get the most eggs with the strongest shells—eggs that bring highest prices. Keep low-cost PILOT BRAND before your flock at all times.

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In the bag with the big blue Pilot Wheel—at most good feed dealers.

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Oyster Shell Products Company
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See the farm building featured on the inside back cover

On that page you'll see another outstanding, practical farm building of steel. For more information on all types of steel farm buildings, send this coupon.

United States Steel Corporation,
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Please send me more information on factory-built steel buildings.

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City..... Zone.... State....

Your request for information will be forwarded to steel building manufacturers.

USS United States Steel
TRADEMARK

Mr. Grimshaw's Pump Breaks Down...

Well, it didn't break down, exactly. It was just that the last year or so the pump had a kind of hum in it, and Donald Grimshaw got to thinking that after ten years of service it ought to be looked at. But it was always in use, and you know—

Maybe we ought to go back a little. Donald and Howard Grimshaw are partners in Willow Brook Farm, a 112-acre truck farm near Lake City, Pa. They grow tomatoes, grapes, sweetcorn, peaches, asparagus and melons.

They've been irrigating since 1938, mostly open ditch type at first. About ten years ago they purchased a demonstrator irrigation pump, Model 5404, from our Pittsburgh, Pa. distributor, Beckemann Engineering Sales. The pump had been used a fair amount when they got it, and they've had it in service every year since, excepting only one real wet season.

There are two ponds on the farm used for irrigation. The larger one is 175 feet long, 35 feet wide and 5 feet deep. Lot of water. In fact, the Grimshaws' irrigation system is the largest in the area. The equipment, all portable, consists of 1000 feet of 6-inch and 1500 feet of 4-inch aluminum pipe, with McDowell couplings and 1-inch Skinner sprinkler heads. Plus one Gorman-Rupp irrigation pump, Model 5404 like we said, powered by a Chrysler engine.

The pump operates 15 sprinkler heads placed 60 feet apart, using 500 gpm. There's 60 lbs. pressure on the last sprinkler head, and about 125 lbs. at the pump. Ground coverage is about one inch every 2 hours, and it takes 2-3 hours to move the pipes and start up again. Using a 1-inch sprinkler gives the water more time to soak in. Keeps the ground from packing down, too, and prevents run-off loss.

About that hum. Couple months ago Donald Grimshaw finally got the time, skidded the pump onto the farm truck and brought it to our plant. That's it with Mr. Grimshaw in the picture below. First time in the ten-year period that the pump ever had any work done on it. Repairs consisted of one bearing and seal. Oh yes, and a check valve.

No crop-watering problems on his farm

Mr. Grimshaw took the pump right back with him. Don't know when we'll see him here again. And that points up a moral. Irrigation pumps have to be rugged and dependable—stay on the job year in and year out with the least possible maintenance, repair cost or down-time.

That's just exactly what Gorman-Rupp irrigation pumps are built to do. Types and sizes for every requirement. Self-powered or PTO tractor-driven. ● *See your local Gorman-Rupp Distributor, or write us direct.*

THE GORMAN-RUPP COMPANY

305 Bowman Street **Mansfield, Ohio**

Gorman-Rupp of Canada Ltd., St. Thomas, Ontario

members was a prominent farmer or rancher or an official of one of the new industries. The drive sold $302,000 in stock to some 400 investors and the Sneed Estate loaned the balance of the funds necessary to complete the $475,000 building which opened in April, 1952, under the name of the Sneed Hotel. The loan is payable at the rate of $10,000 per year with interest.

The building is a modern 4-story affair, so designed that another four stories can be added if future demand calls for expansion. There are 69 rooms, and banquet facilities for 350.

Hotels have never had a reputation as the most lucrative investments, but the Sneed will complete its tenth year in 1962 with a record of having made every payment on its notes and prospects for good years ahead.

Money For Homes

Another symbol of the do-it-yourself spirit of the Dumas community is the modern headquarters of the North Plains Savings and Loan Association on the east side of town. Buck Wells is president of this institution. "And," says he, "it was almost seven years too late."

With the influx of new families there was a great demand for homes. But the homes had to be built. "Funds for building were pretty slim in the county," Wells recalls, "and people who wanted to put up new homes were going all over to get their loans.

"Then, about three years ago, Harold Shoulders—he's now our secretary-treasurer—suggested organizing our own savings and loan. A few of us talked the thing up and it wasn't long until we had it going.

"We offered $100 par value stock at $135 per share, the $35 going to surplus, and completely sold out the offering of $150,000 of capital stock in three days."

There are about 40 stockholders in the association—farmers, ranchers and businessmen—and among the nine-man board of directors are a farmer, a lawyer, a pipeline contractor, the county agent, a hospital administrator, a gasoline plant foreman, a public accountant, and an official of one of the county's big industries.

To encourage active participation by the stockholders in the affairs of the association, it was recommended that each stockholder own at least one percent of the stock. The bylaws specify that no individual can own more than 10 percent of the stock. Deposits are insured up to $10,000 by the Federal Savings and Loan Insurance Corporation and the association is a member of the Federal Home Loan Bank System.

To build up surplus and reserves the directors agreed with the FSLIC to pay no dividends to the stockholders for five years. Some $40,000 in dividends were paid to depositors, however, during the past year.

The association now has $1.7 million in total assets, $1.3 million of which are in first mortgage loans. Most of these loans are on residences in the $12,000 to $15,000 bracket. The association also makes loans on business and farm improvements. Most loans are amortized over a 20-year period at a 6½ percent prime rate.

To get the young association off to a good start, one of its directors, Harvey A. McGinnis, built the office building it calls home and rented it to the association until it was in a position to buy it.

In such ways do the modern Ding-Dong Daddies do their stuff. The town also boasts an up-to-the-minute hospital financed through county bond issues; a neat, well-kept airport; and a new library is under construction, the result of a $100,000 gift by C. L. Kilgore, one of the county's veteran ranchers. If there is a need to be met or a job to be done, the Dumas spirit fills the bill.

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The Hesston Straw Chopper on your combine whips your heavy-straw, tough-stalk problem as you harvest. Free-swinging hammers shred residue as it leaves your combine into easy-to-plow-under lengths . . . spreads them evenly over the field. Eliminates bunching . . . makes plowing easier . . . saves one or two diskings. Hesston-shredded straw decomposes quickly, returns nitrogen to soil, improves humus, helps soil retain moisture and resist erosion. Ideally suited for wheat, oats, soybeans, rice, barley, flax, lespedeza, and many other crops. Available for most combines.

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CUT, SHELL, SHRED, SPREAD 4 ROWS AT A TIME!

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Ask your dealer about this new General Electric 110° Tractor lamp. It's beam is the widest. The 6 volt lamp is #4022 and the 12 volt lamp is #4422.

P.S. If you want a combination flood and red tail light, get #4024 (6 volt) or #4429 (12 volt) in a special fixture

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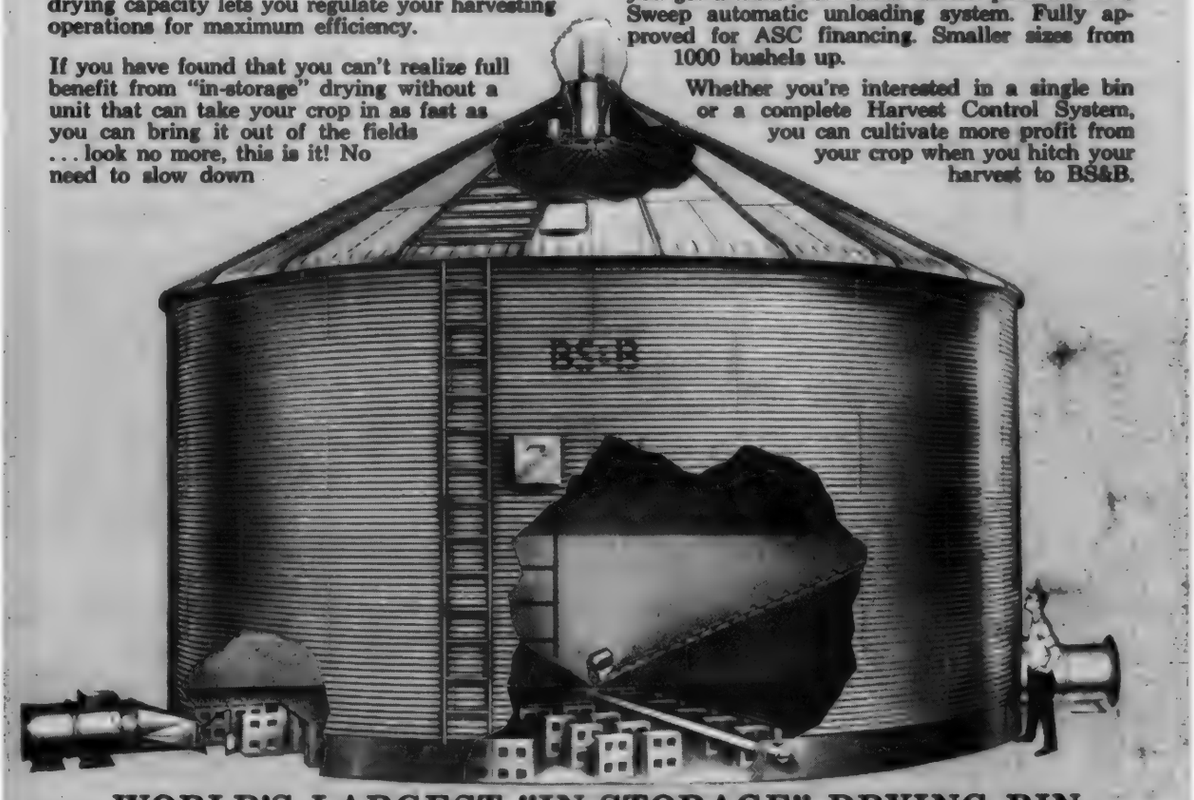
HITCH YOUR HARVEST TO THIS STAR!

13,500 bushels . . . that's the capacity of BS&B's new King-Size Drying Bin! It's the one unit that keeps pace with modern harvesting equipment. Like smaller drying bins this King-Size unit lets you sell or feed a greater harvest at a higher value . . . thereby giving you a better return on your production investment. In addition, the King-Size drying capacity lets you regulate your harvesting operations for maximum efficiency.

If you have found that you can't realize full benefit from "in-storage" drying without a unit that can take your crop in as fast as you can bring it out of the fields . . . look no more, this is it! No need to slow down your harvest rate or leave loads of grain sitting around until the bin can handle it. As shown by the Select-O-Harvest chart, BS&B's King-Size Drying Bin adjusts to *your* harvesting rate.

No loading or unloading chores either. In addition to the 36′ x 16′ bin with drying equipment you get a motorized loader-leveler plus the True Sweep automatic unloading system. Fully approved for ASC financing. Smaller sizes from 1000 bushels up.

Whether you're interested in a single bin or a complete Harvest Control System, you can cultivate more profit from your crop when you hitch your harvest to BS&B.



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TENTH Fill 1250 bu
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SIXTH Fill 1250 bu
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FOURTH Fill 1250 bu
THIRD Fill 1250 bu
SECOND Fill 1250 bu
FIRST Fill 1250 bu

NORMAL HARVEST RATE

SEVENTH Fill 1000 bu
SIXTH Fill 1250 bu
FIFTH Fill 1250 bu
FOURTH Fill 2500 bu
THIRD Fill 2500 bu
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FIRST Fill 2500 bu

FAST FIRST FILL

BATCH DRYING SYSTEM

Select-O-Harvest

If you want to harvest at a steady rate, it will take 1250 bushels per day for 11 straight days. If you want to stagger your rate, bring in 10,000 bushels at 2500 a day, wait four days and add 3500 more bushels at 1250 per day. Batch drying? Sure . . . you can put in 3200 bushels just as fast as you can haul it out of the field and it will be dried down in 36 hours!

For more information on King-Size Bin Storage Drying Systems fill in the attached coupon.

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Table A **INCOME OPPORTUNITIES FOR HITCH OPERATIONS**

Item	Unit	Irrigated Wheat	Dryland Fallow Wheat	Irrigated Milo	Irrigated Alfalfa	Existing Feedlot	
Annual Production Unit		1 Acre	1 Acre	1 Acre	1 Acre	9,281 980 lb. Choice Steers	
Yield (Annual Average)		40 Bu.	15 Bu.	40 Cwt.	5 Tons Hay	After 1% Death Loss, 3% Shrink in 135-day Feed,	
Price		$1.70/Bu.	$1.70/Bu.	$1.50/Cwt.	$17/Ton	6% Shrink Out $23/Cwt.	
Crop Land	Acres	1	2	1	1.25	(277 Acres Silage)	
Range Land	"	—	—	—	—		
Labor Required in							
Winter	Hours	—	—	—	—	—	
Spring	"	.82	.20	2.01	2.09	—	
Summer	"	1.05	1.18	1.70	2.40	—	
Fall	"	.86	.42	.55	.52	—	
Total	"	2.73	1.80	4.26	5.01	3 Full-time Men	
Irrigation Water in							
April-May	Acre Inches	7.0	—	3.0	17.6		
June	" "	—	—	3.0	8.8		
July	" "	—	—	3.0	8.8		
August	" "	—	—	3.0	8.8		
Sept.-Mar.	" "	5.0	—	3.0	10.0		
Total	" "	12.0	—	15.0	54.0		
Annual Fertilizer Application							
Nitrogen (N)	Pounds	70	20	90	—		
Phosphorus (P_2O_5)	"	30	—	50	48		
Initial Investment Needed	Dollars	—	—	—	—	94,985	
Gross Income	Dollars	68.00	25.50	60.00	85.00		2,091,937
Annual Expenses	"						
Marketing and Storage	"	5.40	2.03	8.52	—	23,203	
Seed and Fertilizer	"	11.40	3.80	13.20	5.04	—	
Water	"	7.56	—	9.45	34.00	—	
Labor	"	2.73	1.80	4.26	5.01	9,781	
Machine Operation	"	.78	.96	1.56	.35	7,250	
Custom Work	"	6.00	5.00	6.25	38.50	—	
Maintenance	"	—	—	—	—	14,648	
Livestock Purchases	"	—	—	—	—	1,394,531	
Livestock Purchase Fees	"	—	—	—	—	16,406	
Veterinary and Medicine	"	—	—	—	—	9,375	
Misc., Insurance and Supplies	"	1.45	.50	.50	1.00	8,885	
Feed (Includes Silage Costs)	"	—	—	—	—	389,472	
Trucking	"	3.20	1.20	5.00	7.50	89,916	
Sub Total	"	38.52	15.29	48.74	91.40	1,963,467	
Depreciation	"	—	—	—	—	22,836	
Interest and Taxes on Facilities	"	1.70	1.21	1.88	3.43	65,895	
Direct Crop Overhead*	"	9.40	18.80	9.40	11.75	—	
Total Annual Expenses	"	49.62	35.30	60.02	106.58		2,052,198
Profit Before General Overhead†	"	18.38	— 9.80	— .02	—21.58		39,739

* Covers Interest and Taxes on Land and Machines, plus Salary and Houses for two Utility Men, and Maintenance and Depreciation on all Crop Equipment. Does not cover Salary, Expenses and Houses of Crop Manager and Assistant Manager.
† Profit before either Crops or Feedlot Management Expenses, or General Overhead for Total Operation.

Table B **Recommended Operational Plans at Increasing Annual Operating Capital Levels**

Plan		1	2	3	4	5	6	7
Added Irrigation Investment	Dollars	—	—	—	74,098	85,025	85,025	85,025
Added Feedlot Investment	"	—	—	—	—	—	94,985	711,229
Total Added Investment	"	—	—	—	74,098	85,025	180,010	796,254
General Farm Overhead	"	67,019	67,019	67,019	67,019	67,019	67,019	67,019
Crop Overhead	"	40,691	57,589	66,924	75,784	82,323	79,537	73,098
Feedlot Overhead	"	—	—	—	—	—	52,650	142,878
Prorated Direct Operating Costs*	"	126,648	171,375	205,061	242,341	265,826	1,061,152	2,876,692
Total Operating Capital Needed to Sustain Annual Operation	"	234,374	296,083	339,004	385,144	415,168	1,260,358	3,159,687
Existing Irrigation Crop Program								
Wheat	Acres	2,874.3	2,874.3	2,874.3	2,874.3	2,874.3	2,874.3	2,874.3
Pinto Beans	"	162.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Soybeans	"	—	—	917.0	917.0	917.0	640.0	—
Silage	"	—	—	—	—	—	277.0	917.0
New Irrigation Crop Program								
Wheat	"	—	—	—	906.0	906.0	906.0	906.0
Soybeans	"	—	—	—	—	—	650.0	650.0
Existing Feedlot (No. Sold)	Head	—	—	—	—	—	9,281	9,281
Expanded Feedlot (No. Sold)	"	—	—	—	—	—	—	21,409
Crop Labor								
Full-time Workers	Men	4.0	4.5	5.25	6.50	6.75	6.75	6.75
Spring Workers } Man-hours per		—	1,340.0	2,465.00	2,425.00	3,350.00	3,457.00	3,618.00
Summer Workers } 90-day period		510.0	1,360.0	2,040.00	2,176.00	2,897.00	2,999.00	3,230.00
Feedlot Labor								
Full-time Workers	Men	—	—	—	—	—	3.0	8.0
Expanded Feedlot Capacity	Head	—	—	—	—	—	—	8,649
Expanded Irrigation System	Wells	—	—	—	2-8" Wells 2-6" Wells	5-8" Wells	5-8" Wells	5-8" Wells
Gross Income	Dollars	209,222	280,452	333,409	395,017	432,555	2,508,495	7,297,067
Total Annual Expenses	"	222,337	296,083	339,004	385,144	415,168	2,468,277	7,124,246
Net Income Before Income Taxes	"	—25,152	—15,631	—5,595	9,873	17,387	40,218	172,821

* Operating capital needed before sales are made from which continued operation can be financed.

PROGRAMING FOR BALANCE

(*Continued from page* 54)

The report advises that the feedlot is definitely profitable, although it "ties up large amounts of capital. . . . Only when capital is not restricting and all crop-land has been planted, does its place in the program become clear. Beef feeding will permit expansion of gross income and profit."

Then comes the payoff. This is the presentation of seven recommended operational plans for the Hitch farm and ranch based upon increasing annual operating capital levels. These plans are Table B, page 120.

The first three plans are losing propositions. It is not until the irrigation system is expanded with new wells and a total of $385,144 in operating capital is expended, that a profit appears.

The report incorporates the following narrative explanation of each of the plans:

"In Plan 1, wheat is brought into the plan to the extent of the allotment on land which can be irrigated. Pinto beans use labor and water not used by the wheat.

"In Plan 2, pinto beans, the second most efficient users of capital, are expanded to 1,000 acres, the limit for specialty crops.

"In Plan 3, the remainder of the existing irrigation system is utilized by soybeans.

"In Plan 4, an added investment is made in two eight-inch and two six-inch irrigation wells which are used to bring in the remainder of the wheat allotment. This investment in irrigation would take priority over other possibilities, even use of the existing feedlot facilities.

"In Plan 5, the new irrigation development is expanded to the equivalent of five eight-inch wells. This provides sufficient water to plant all cropland. Soybeans came in on the remaining 650 acres.

"In Plan 6, the existing feedlot is modernized and filled with cattle. Until total annual operating capital supplies available (cash and/or credit) exceed $415,168, the feedlot should lie idle. Capital is theoretically 'scarce' and the cropping program uses money more efficiently than the feedlot. As operating capital increases over $415,168 the lot is used until capacity is reached at the $1,260,358 total operating capital level. Soybean acreage is reduced and planted to forage sorghum for the feedlot.

"In Plan 7, the feedlot is expanded. All soybeans produced on the north farm are gradually eliminated as the lot expands and the acreage is planted to silage. The old mill has been torn down and a new $70,000 installation put in its place. Also a 450-gpm well is provided for cattle water."

At present it would seem that any similarity between the recommendations of Doane's Precision Program and the current operation of the Hitch establishment is purely coincidental, as they say in the movies.

"We like the recommendations for pinto beans and soybeans," Lad comments, "and we were about ready to try a few hundred acres of them this year.

"Then, in March, Washington raised the support on milo and we decided to put everything we can into that crop. We could handle beans, though, without having to invest in new equipment.

"We take a brighter view of dryland farming than the plan and we're going to continue dry cropping with wheat and milo on land we can't irrigate.

"We don't intend to drill any more irrigation wells until we're sure we can get the gas to operate them. Just about every section of this land has a gas well and we're dickering with the lessees for the right to use some of that gas. That would certainly help out on our operating costs. Since we have our feedlot setup and are pleased with the results, we do not intend to discontinue the lot in favor of more irrigation.

"None of the suggested plans include milo production. That's because wheat at $1.70 to $1.80 and with yields of 40 bushels, kicks out milo at $1.50 a hundred at yields of 4,000 pounds. But we're going to grow milo. We can make a profit feeding it to our cattle. We feel pretty certain that we can get better yields than the 4,000 pounds per acre anticipated in the analysis, and the support price has been raised to $1.93.

"One of the chief reasons I wanted this precision program was to find out if it would be smart to expand our feedlot. The answer as I read it is 'Yes.' We are going ahead with the expansion, and probably within the next five years we'll work our

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way up to 10,000-head capacity.

"We've found we can actually make more money raising and feeding silage than in practically anything else we can do here. We've gotten to the point where we now have five order buyers filling our orders week after week, and we have just about gotten to the point where we have something to sell every week. Our cattle are beginning to get a reputation and that puts us in a better position pricewise."

Lad feels the precision program is an excellent guide. But he makes no pretense at following it to the letter.

"We've tempered it with our own experience," he says, "and we'll use it to help us stay in balance. The figures and recommendations on alfalfa production alone have already saved us a considerable piece of money. They confirmed our suspicions that alfalfa was a water hog, and we're going to put that water to better use.

"It's always a good idea to get some experts from the outside to take a good look at your operations and point out the soft spots. You don't just pick up the program, though, and walk into your banker and say 'Here, let me have a million dollars. I'm going to take a crack at plan x.' But you can bet your boots that your banker will have a lot of respect for the program, and it will give you a sure-fire piece of ammunition to back up any loan application you make."

HERMAN'S BIG POTATOES

(*Continued from page* 75)

them with a sorter. We don't use sacks for the same reason.

"Except for wireworm control there are practically no pests in this area. Neither bugs nor wilt nor scab nor disease of any kind, except rare and light infestations of leafhoppers and aphids."

Herman stays away from the nitrates in his fertilizer. These, he says, will deform a potato. He likes manure for all crops except potatoes. "Unless manure has been on the ground three or four years it will invariably cause scab," he says. He fertilizes but once. "Last year I thought I'd just try an application about midseason," he continued, "but I got too many deformed potatoes and the plants went to tops."

Herman's harvest procedure is simple but effective. He plows out the potatoes, beginning in the early morning—just enough so that he can have them all picked up and out of the sun by eleven o'clock. He hauls them to his warehouse, has lunch, and spends the afternoon washing and sorting the morning's harvest. He fills his orders according to priority and sacks a part of each day's harvest in 10-pound bags for chance customers.

He has table-tested potatoes from all parts of the country and says that for flavor and texture the Oregon spud is tops. "The famous Idaho baker can't compare with the same potato grown in Oregon," he says.

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Unloads at either end. Takes only seconds to reverse. Chains are always PULLED in the direction of travel.

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Fill with Even-Flo. My silage is well mixed BEFORE fermentation, no separation of cobs, corn and leaves before fermentation. This is your KEY to TOP QUALITY SILAGE.

Even if you mix silage during feeding—after fermentation—you only hide the bad silage in the good and lower the total quality of the feed in the feed bunk.

Even-Flo fills corn or grass, installs easily under all unloaders. No motor needed.

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WITH EVEN-FLO YOU GET UP TO 20% MORE SILAGE IN THE SAME SIZE SILO.

See your Silo Company, Dealer, or write

EVEN-FLO SILAGE DISTRIBUTOR INC.

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Herman explains that the famous Idaho baker is not a variety of spud at all, but a size. According to U. S. trade practices a baker must weigh twelve ounces or over, and any potato of that size can be marketed as a baker. "Oregon potatoes will bake as well as Idaho potatoes, and many Oregon potatoes are sold as Idaho bakers. The Idaho potato growers have done a good job of promotion, but they haven't cornered the market on baking potatoes. The spud-eating public seems to prefer a white or russet baking potato but the reds bake just as well. All western potatoes bake better than Maine or Michigan potatoes, even the same varieties. It's climate and soil.

"A baking potato can be too large—about 24 ounces is the size limit. The most popular variety for baking is a white potato known in Oregon as the Netted Gem. It's called a russet in Idaho."

Herman says that growing potatoes is limited by diminishing returns. "For me," he says, "that's around four or five acres. Beyond that I would have to hire too much work done and I would run into marketing problems. That's what makes my operation profitable—I do my own marketing direct."

Herman has two children, a boy and a girl, both adopted. "I didn't get any further in school than the eighth grade," he says, "but these kids are going to have the best. We've already started saving for college for them. That will take a lot of spuds."

FIELD WAFERING

(*Continued from page* 67)

of the waferer. A bypass pump gives constant recirculation, so molasses could be added to the water—up to 50 percent.

Output of the Lundell machine is rated at five to six tons an hour. This doesn't include the normal delays in field work like turning, changing trailers, refilling the water tank, or refueling. Three to four tons an hour would be a safe expectation for a day's work. The machine costs $6,500, including the motor. The flail cutter-conditioner costs an additional $1,400.

Cal-Cube Machine

In Woodland, California, they have built three machines, one self-propelled and two trailed, although one trailed machine has not yet operated in the field. But the first two ("strictly experimental machines" Donald Vaughan called them) have produced about 2,000 tons of wafers under field working conditions. The project is a cooperative venture between Vaughan Manufacturing, Inc., and Johnson Farm Machinery, an equipment manufacturer in Davis, California. The scheme was financed by the Heidrick brothers, operators at a 42,000-acre diversified farm, where the machines work. The wafers were sold through a hay dealer.

The Cal-Cube waferer is a piston-type machine, with dies 1½ inches square. The

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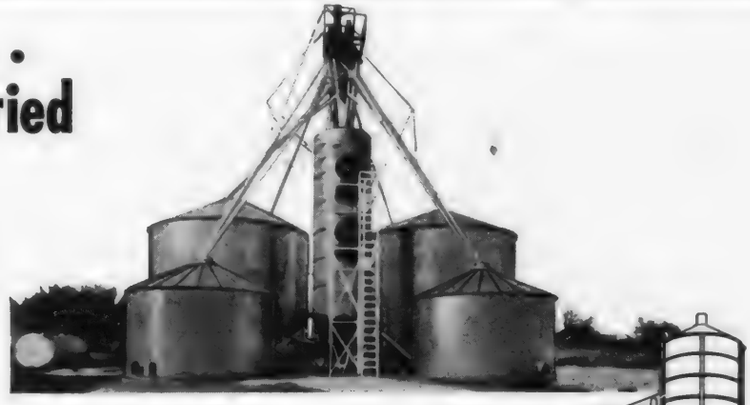
700 bu. per hour . . . picked, shelled, dried and in the bin . . . *with* ACE HIGH



The Myers Brothers operate 7,000 acres in Red Willow County near McCook, Nebraska. They average 75 to 80,000 bu. of corn per harvest. Like all good farmers, the Myers Brothers know you can't profitably market grain standing in the field. Only grain of acceptable quality sold at the right price pays off.

The Myers Brothers use a two and a four row picker-sheller. The total capacity of this equipment is from 650 to 700 bu. per hour. Now here are the facts as told by Adair Myers: "Between October 1 and November 21, we harvested 46,000 bu. of corn at an average moisture content of 21% with some lots as high as 28%. We found that we could safely dry down to 12.5% in one pass through our ACE HIGH dryer. Samples taken from our storage bins periodically during the winter have all graded #2 or better. Our total cost for drying, exclusive of labor, has averaged 2.3¢ per bushel. We're mighty happy with our ACE HIGH Continuous Flow Dryer."

When the chips are down and the profit of a year's work is at stake it pays to be equipped to do the job. With an Ace High Continuous Flow you can harvest at the rate that suits your equipment and the weather . . . you dry as you harvest.

Check these features in Ace High Continuous Flow Dryers:

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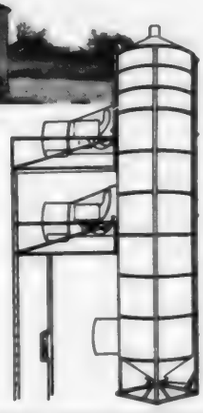

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I'd like complete information on the Ace High Continuous Flow Dryer.

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People and Pesticides

Niagara Chemical Division operates 16 plants in different agricultural sections throughout the United States, and two each in Canada and Mexico. Each plant produces pesticide formulations tailored to the needs of the surrounding farm country.

Such decentralized manufacture, according to Jim Jones, production coordinator for these 20 units, makes Niagara "in one sense, the most non-uniform company in the business. Crops are different all over the country," he explains, "and formulations required in one area differ from those needed in another. For example, where airplane dusting predominates, you need a different dust from that required where ground dusting is the common practice. We try to give a man the pesticide he needs in the form he can use to best advantage."

But if Niagara's production is purposely non-uniform in this respect, it is strictly uniform in all other respects. For it is Jim's job to see that all plants come up to top performance in product quality, costs, safety, process methods, employee training and employee relations. This requires working with managers and production superintendents of existing plants, and supervising installation of all new production facilities.

Having responsibilities in such widespread locations naturally involves a lot of travel. Last year, for example, Jim was away from home base in Middleport, N. Y., exactly half the time. He made a number of trips to Greeley, Colo., and Ayden, N. C., where new plants are under construction, hit the states of Washington and Oregon more than once, made three trips to Opelousas, La.—where Niagara's newest plant has just been completed. He also found time to fly to The Netherlands to study some new production techniques developed by a Dutch pesticide firm.

Emphasis on uniformity of production methods, Jim feels, is the most important factor in uniformity of products. "People must do the same thing in the same way—with no shortcuts." Planning—from design of production methods to provision for testing all along the line—is vital to turning out a good product. Equipment design, too, has a lot to do with results. "You must have the right equipment to do a good job," he says. "Where standard mixers or other equipment won't do the job, we adapt them to our production needs."

The specialized knowledge Jim brings to his work has been accummulated in a 21-year career as a chemist. Born in Canada, he graduated from Queens University, Kingston, Ontario, in 1940. When the Canadian Government decided that Jim could serve better as a chemist than in the RCAF, he went to work for the government in an explosives plant. Starting as an analyst, he rose to officer in charge of all inspection before the war ended.

After the war, Jim joined Niagara as assistant chief chemist. He has successively held positions as chief chemist and plant superintendent at Middleport until his recent promotion to production coordinator for the entire Division.

When he's not traveling, Jim spends his off-hours as an enthusiastic "do-it-yourselfer"—fixing up things around his Middleport home for his wife Bea, also a native Canadian and his three daughters.

Niagara's business is built on experienced people like Jim Jones . . . on pesticides produced "in the form a grower can use to best advantage" on his particular crops in his particular section of the country. Our growth depends on their effectiveness in helping farmers grow more . . . profit more.

Niagara

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FOOD MACHINERY AND CHEMICAL CORPORATION
Niagara Chemical Division
Middleport, New York

trailed machine has three dies, for a single piston; the SP has six, with two pistons. An auger feeds the hay to the piston, which, reciprocating at 400 strokes per minute, drives the hay through the dies. The exact construction of the dies is still kept secret. But note one Cal-Cube machine has about nine square inches of die area, the Lundell about 150 square inches. The speed of hay passage is very different. One can't speculate on dwell time without knowing the length of the dies.

The Cal-Cube machine also picks hay from a windrow—any hay—with no requirements for previous treatment. They prefer hay under 20 percent moisture. The hay is picked up by a wide belt with fingers jutting from it like a seed harvester. This passes the hay to a chute up which it is elevated by walkers—rake-like arms forking the hay upwards. Then the hay is fed into a vertical auger by a vertical metal drum with retracting fingers on it. These provide steady, even flow to the auger and the piston.

The self-propelled model weighs 29,000 pounds. The older trailed model weighs 15,000 pounds, the newer should be around 10,000. The SP model has a 200-horsepower engine to drive the unit. The smaller models use an 85-horsepower diesel.

The sizes and weights of these first two machines are enormous, and the machine themselves are clumsy and bulky. (One uses a truck chassis, the other's chassis is made from 1¼-inch steel plate.)

But these were the first machines. The third, at five tons, is much better looking and more manageable. All of them, though, are refined waferers, with a magnet to remove hardware, water spray (either on or off, at 12 gallons per hour from a 100-gallon tank), and broken wafers and fines are returned to the dies.

All three machines fill their own bulk bin, holding about a ton and a half of wafers which are hydraulically dumped.

"The large machine does three tons an hour," said Don Vaughan, "and the old trailed model two tons per hour. We feel the new trailed machines, with twin pistons and four dies, will do about three tons an hour. It depends on the length of the windrow,

ARE YOUR PIGS SITTING ON A KEG OF DYNAMITE?

A federal veterinarian recently described the national hog cholera situation as "ripe for a blow-up." Why? *Because the hog cholera vaccination rate is the lowest on record!* States have declared emergencies—banning shipments, slowing movements at auction barns and urging quarantine laws. So, don't wait! Vaccinate! **ANTRATE®-H.C.** is a concentrated blood globulin solution having at least *two times the potency* of anti-hog cholera serum. Because this is so, dosage is cut in half. This is particularly desirable when large doses are needed, as in the case of exposed pigs. Antrate-H.C. is especially well suited for use with Armovac-A to give a strong active immunity. **ARMOVAC®-A** is a safe modified live hog cholera vaccine successfully used throughout the U.S.A. since 1957. It works hand-in-hand with Antrate-H.C. to provide *a new concept in hog cholera immunization.*

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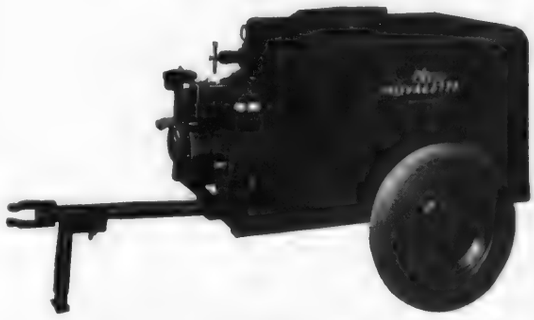

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Consider the many jobs you can do with a John Bean High Pressure Sprayer and it's easy to figure how it will pay for itself many times over in hours of labor saved. Consider its easy operation, low upkeep and complete dependability and you'll agree that dollar for dollar, it's the finest sprayer you can buy. John Bean pumps feature lifetime Sapphite cylinders, so hard that even spray materials containing abrasives will not wear them. Special "Bean Bond" lining process prevents corrosion, assures longer tank and boom life. Whatever your specific spraying requirements, you'll find the exact model you need in the complete John Bean line. Pump capacity, tank size, type of boom, accessories, power take-off, skid or trailer mountings are a matter of choice.

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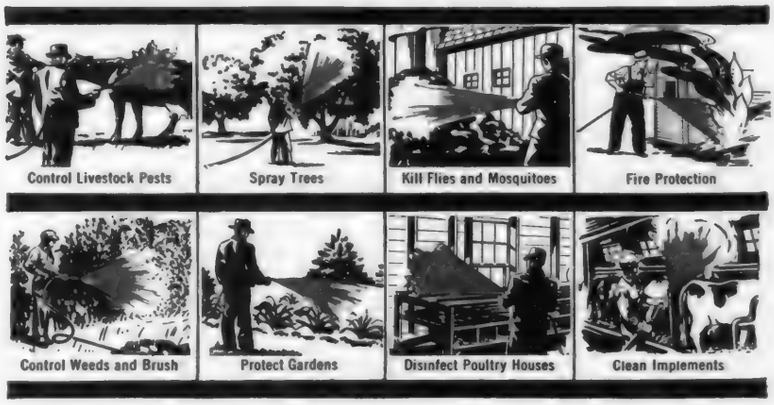

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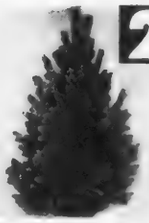

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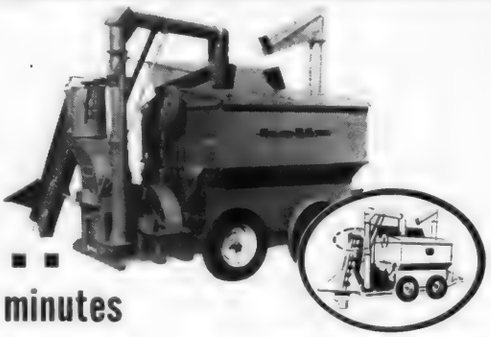


2 tons of feed in 20 minutes

One man with one tractor and the NEW HELIX GRINDER-MIXER does the *whole* job *twice as fast* as other machines!

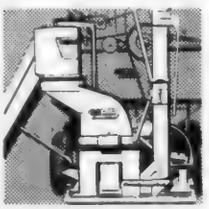
No other portable farm grind-mixing equipment can match the tons of feed you can put thru this new Helix Combination Grinder-Mixer. It has double the capacity of most burr mills—grinds, mixes, blends, unloads 200 pounds of feed per minute. (Hammermill itself handles up to 450 bushels of ear corn per hour, either dry or high moisture!) This amazing capacity is possible because ground feed is moved out of the mill by the unique Helix underslung auger that does away with limited-capacity suction discharge fans and dust collectors of conventional hammermills.

The result: *the first really dustless hammermill.* There is no air blast—no undesirable fines—no feed separation to lower feed quality and palatability.

For ensiling Purdue-recommended chunked high-moisture ear corn,* the Helix Grinder-Mixer will grind to any feed size required, faster than the output of *two* 2-row pickers.

Ask your favorite dealer today for a demonstration on your farm. Find out how the Helix Grinder-Mixer will pay for itself in 18 months on all your feed handling chores. For more information, write:

Elevator swivels more than half circle (200 degrees) even while machine is in operation. Lets you set up to grind grain out of several bins or from wagons without backing into position. Raises to 24" height for transport. Manual loading controls, within easy reach of operator, permit one man to do the whole grinding and mixing job.



Helix is the first completely dustless hammermill. Underslung power auger moves feed out of mill fast, replaces conventional dust collector and fan. There's no feed separation; no fines.

*Gave better gains at 35% moisture than the same quantity of shelled corn.

helix corporation

Crown Point, Ind. Dept. 2-V

the amount of turning you do and the thickness of the crop. That tonnage is the actual production dumped into wagons. We've never measured the output right from the dies."

Costs? "Our idea of production costs would only be a haphazard guess," said Vaughan. "Perhaps the new lightweight dual would be $12,000 to $14,000. The SP machine would be in the $18,000 to $20,000 region. But that's a guess."

John Dobie is an agricultural engineer with the University of California at Davis. He, perhaps more than any other individual, has been the confidant of many manufacturers and researchers of wafer machines. He has worked on several of the trials to which no journalists were invited. He has had the chance to study, as a non-partisan viewer, the problems of developing a wafering device. And Dobie reflected in his austere office, surrounded by wafer samples of a dozen shapes from as many machines, that producing a wafer was only half the problem.

"Unless you can get an advantage in handling wafers over current methods of hay production, it's a little difficult to justify the hullabaloo," said Dobie. "The first stage was to get some machines making wafers so we had some wafers to handle. We've arrived there. Now we have a lot of work to do to compare different types of wafers and methods of handling." He continued, "In my experience, every transfer from one conveyor to another causes some damage, either loosening of a normal wafer, or chipping of the corners of a very dense wafer. You get an accumulation of fines under every delivery point. And the whole wafers of any shape tend to roll to the outside of the pile."

(The term "fines" cries out for a definition. The fines from wafers vary from dust to large parts of the stems of plants, up to several inches long. The fines which occur from wafer handling look like coarse chopped hay.)

"We've used three kinds of trucks out here to handle wafers," said Dobie, "the hopper bottom truck, dump truck and flat-bed types. The dumper looks the best of these, but still leaves much to be desired. Handling is best done in large amounts. Even with a large scoop, the act of lifting the wafers causes movement in the pile, resulting in some damage.

"We're going to try bringing the truck and trailer to the field this year, so the hay can be loaded directly from the waferer into the delivery truck. There'll be an extra trailer, so the waferer keeps going while the truck is delivering. The truck waits to be filled, and then hitches to the already full trailer. But for some time I think we have to assume much of our wafered hay is going into intermediate flat storage, in spite of our wildest dreams to deliver direct from field to consumer."

Two California dairy farmers, with farms about 100 miles from Woodland, have fed

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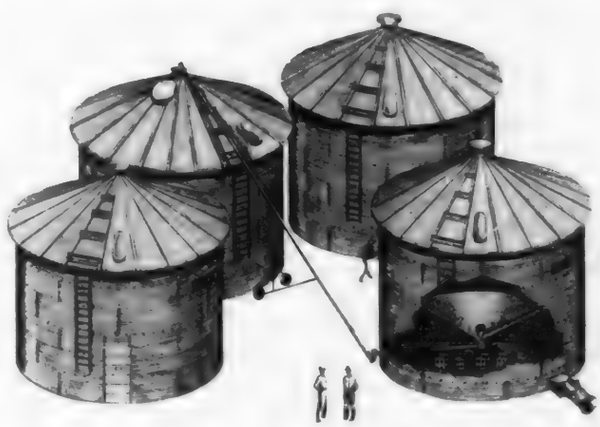
Use a Single Heater and Fan — Dry a Fill Per Day!

The **Long Twin-Bins** are designed to use a single Long drying fan and supplemental heater with the double transition assembly. You actually operate two drying bins with a single fan and heater. This lowers your first cost; operating and upkeep costs are low, too. Automatic temperature and humidity controls make the job easy. Long Twin-Bins are made in sizes that have a combined capacity of from 2,000 to 12,000 bushels.

The **Long Bin Batch Dryer** uses one drying bin and as many as eight storage bins grouped around the drying bin. The drying bin is equipped with the Long bin unloader and the drying fan and supplemental heater. This gives you a low cost continuous drying operation. As each batch is dried, it is moved to one of the storage bins quickly and easily with the Long bin unloader and grain auger. Drying and storage bin capacities are available in fourteen sizes from 1,000 to 15,000 bushels each. Start out with one, two or more storage bins and add additional bins as needed.

Either one of these Long Grain Drying Centers will bring right to your farm the extra quality and extra yields that you get from early harvesting and proper drying. They will do it easier and at a much lower cost than you may think.



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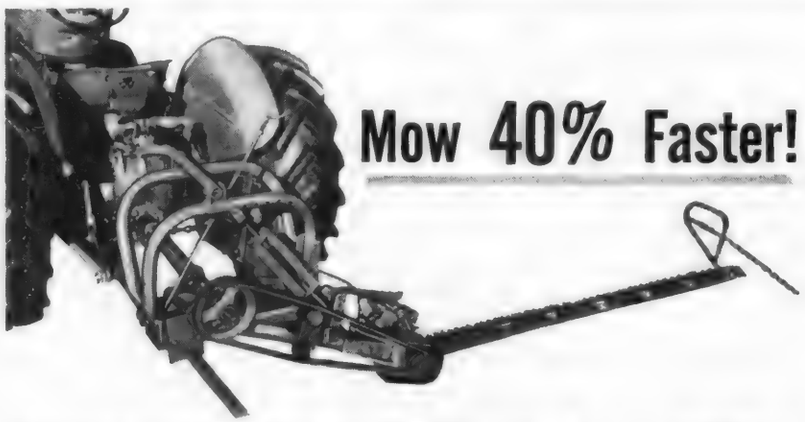

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most of the production of the Vaughan machine. Between them they have fed around 2,000 tons of wafers, paying $5 above market price per ton for the privilege of having their hay in 1½-inch cubes.

Both farmers are sold on wafers, even though they are using completely different methods of feeding. Both buy wafers from the same dealer, who handles them from the Heidrick brothers' farm.

C. M. Morelli has fed wafered hay for three years to his Guernsey herd. For the last two years he has used his own cable-drawn conveyor in an 160-foot bunk to feed his 170 milkers.

"We used to feed chopped hay in separate feeders," said Morelli. "Some of the hay they'd eat well, others they'd not eat at all. But they can't pick and choose among wafers, the feeder mixes the hay and we get very uniform eating. We haven't cleaned out the feeder in the two years since we built it. We haven't had to. We just don't have a fines problem."

Morelli's feeder is a cable with metal flights about a yard apart. At each end the cable runs around a single truck tire, mounted on the wheel. At the drive end the axle is connected to a 5-hp motor. Wooden guides keep the cable on the tires, and the flights are swept back like a jet plane's wings, so the wafers are pushed out to the side of the bunk as well as carried forward. It takes about 10 minutes to fill the bunk.

This conveyor is filled from the barn by a conventional twin-chain conveyor.

The Morellis (C. M. farms with his son Don) could get 150 tons of chopped hay into the barn. They can easily get 250 tons of wafers in, perhaps as many as 350, as they've never completely filled the building. They found, however, the additional weight of wafers needs some support. The barn has cable ties from wall to wall, which have kept it sound. A shed where they store wafers to feed the dry stock was filled with wafers without the precaution of reinforcement. It bulges like a pregnant heifer.

The other farmer who is on permanent wafer feeding is Clarence Rogers, who milks some 180 Holsteins. He, too, is enthusiastic about "cubes," as the Cal-Cube wafers are called.

Rogers built a self-feeding barn 204 feet

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long which will hold 600 tons of wafers. The barn, 12 feet wide, has 24-inch bunks on each side. The bunk floor and the barn floor are the same. The bunk is fed through a sliding panel which will open up to about two feet and allow the wafers to run out. In addition, hinged flaps, like the lids on a pig feeder, can cover all the bunks to shut off all feed. "The cubes feed out fine," said Rogers. "Fines bridge just a little bit around the wall posts, but I didn't have to go inside that barn for three months after it was filled last October.

"Now the first cows out from milking can't pick out all the best stuff and leave nothing but stems for the latecomers."

Rogers' barn cost around $8,000, contract built, which he estimates is one-third less than the same storage for bales would cost. "And I don't have any handling," he added, "until the wafers get low in the barn, when we shovel them out to the bunk. But that's a small job."

Ken Nelson, Cherokee, Iowa farmer of 300 acres, fed 22 tons of the Lundell wafers last winter. He stored them like ear corn, in two picket fence rings. Wafers came in from the field in dump wagons and were unloaded into a portable elevator. Nelson covered the pile with black plastic to keep out rain and snow. On opening the stack this winter, he found some mold, and a little damage to a few wafers under the plastic.

"I believe it will be better to go for storage of wide base, rather than height," said Nelson. "On a nice day you can spread the wafers, and get the advantage of some air drying. You see the outside wafers in this pile are brown, but when I break one the brown color is only a quarter of an inch deep. The rest is green. Wafers give us a chance to handle hay in the same way as ear corn, with a minimum of help. And my sheep sure like 'em."

There doesn't seem to be any doubt about the enthusiasm of these two dairymen and the sheep-feeder about compact storage and ease of feeding of wafers. But the Californians miss some of the problems of wafers as they buy commercial hay, and the trucker is responsible for getting the hay into their barns, as he is for baled hay.

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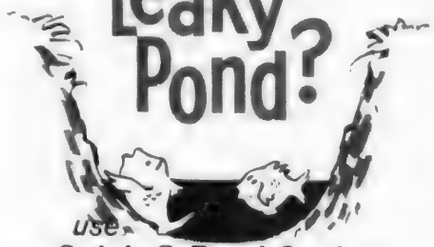

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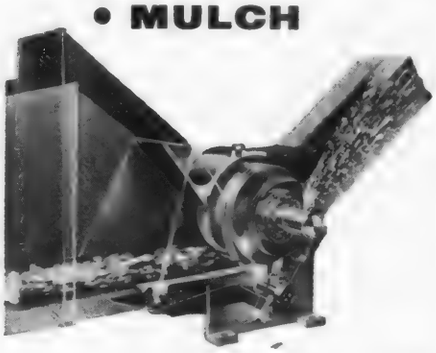

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The Morellis installed a belt along the rafters and used a strike-off board to place the hay along the length of the building. This worked well except the fines ran under the strike-off board and fell off the end of the belt in one pile. This accumulation could cause trouble. At Rogers' barn, the trucker (it's the same one) brought a blower—designed for grain—to fill the building with wafers. The vane which introduced the wafers to the airstream was too small, however, and this caused damage to the wafers.

Another problem is getting the wafers out of the hopper truck used to deliver them by the contractor. Right now they use a very flat belt conveyor (there is only 14 inches clearance under the truck). But this, too, causes wafer damage, as there is rubbing action as the belt pulls wafers from the bottom of a load.

The problems of this trucker would be the problems of a farmer who bought a wafer machine. But a truck can carry 25 tons of wafers per load, as against 19 tons of baled hay. That can mean fewer trips in the long run. Right now the wafers take almost twice as long to unload as a load of bales into the same barn. But the trucker can cut down on labor with the wafers.

The shape of the wafers is important in this handling. The first experimental wafers were plate-like disks, six inches in diameter. They won't flow at all. Doubtless smaller wafers are the answer, either square or round, but not flat. There seems to be little difference in the flow properties of the Lundell wafer and the Cal-Cube, but Cal-Cube is talking about a machine to produce ¾-inch wafers, to improve flow. Smaller wafers will pack better, too, meaning more tons in a given amount of storage. Another advantage of small size is that a large wafer, too big for a cow's mouth, is often wasted as she breaks off part and drops the rest on the ground. Stanchions may prevent this.

The general range of water content at which wafers can be made seems to be lower than 20 percent, or lower than the top moisture content at which they can be safely stored in the West. But the USDA researchers found 14 percent the top moisture content for safe storage in the East. Perhaps better wafer machines will allow harvest of damper wafers which need barn-drying. Unless the wafers are brick-hard, drying seems to be possible with either heated or non-heated air.

What about butterfat depression in dairy cattle due to lack of roughage? The answer so far seems to be an emphatic "none." The hay has not been chopped too fine; it still contains the roughage factor. As long as the hay is not ground before wafering there's no problem.

The biggest problems right now are handling, and fines. When the wafers are fed in fixed amounts daily, the cattle clear up the fines. But in the self-feeding barn they ignore the fines as long as wafers are available. The self-feeding barn had sev-

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eral hundred pounds of fines in the bunks, as well as some wastage on the ground. This is still far less than the waste from baled hay. The mechanical feeder had no waste—a considerable saving.

The quality of the hay, too, may affect the fines. Much of the Rogers hay was stemmy hay, actually wafered from bales, delivered to fulfill a promise to provide all wafered hay. The fines here are coarse, short portions of stem. An earlier patch of wafers, of better quality, gave no fines problem. The fines which broke away from the Lundell wafers made at Yuma from high-quality hay were eaten—although the wafers were preferred.

The simple position right now is that any kind of livestock prefers wafers to baled, chopped or loose hay. No one knows yet, whether an animal makes as good use of wafers as it does of other types of hay.

Some farmers who have tried them, consider them better feed than baled or choppped hay, and will pay more for them. There are two machines that make good wafers; one may be generally available next year. But the job of getting the wafer from the machine in the field to the bunk in front of the animal is one we haven't begun to tackle, let alone begun to solve.

IMPERIAL PASTURE

(*Continued from page* 88)

sending to town the skinny ones. Now my guess on this load of lambs is that they will have No. 2 pelts, will grade out 85 percent Choice, and will average 107 pounds.

"We've just had a change in federal grades that has lessened the amount of internal fat required for choice grade. This will help our alfalfa-fattened lambs. Lambs fill out on top before they fatten inside."

As lambs are shipped out the need for alfalfa acreage is reduced. Farmers then take over their fields and begin preparations for haymaking or for harvesting the alfalfa for the dehydrators in the valley.

The Farmers' Side

One of the 22 lessors in Broadbent's pasturing arrangement is an El Centro farmer, Roy Richtor.

"The farmer has another side to this pasture deal," Richtor explained. "He must keep that alfalfa growing winter as well as summer. With an average of only 3 inches of rainfall per year in this valley, he must irrigate every seven to ten days. Two weeks is too long without water. In this district most irrigation is done in forty-acre blocks with the fields laid out in border checks 25 to 30 feet wide."

The borders are thrown up with disk ridgers, road graders and tilted bulldozer blades. The checks have to be perfectly leveled between borders with a gentle slope.

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age ditch. This border and check method also helps hold down the crusting problem and improves sprouting on new seedlings."

Farmers will usually order a 4 to 6-second-foot stream of water so they can irrigate a 40-acre field in a twenty-four-hour period. "We like to put on three to four acre-inches per irrigation during the winter months. In the hot summer we'll pour on as much as six to eight acre-inches every seven to ten days. From March to October we'll get six cuttings with an average of eight tons per acre plus the winter pasture income," Richtor said. "It takes at least three irrigations and five weeks time to get the alfalfa mature enough for safe pasturing."

In the two and three-year-old stands particularly, the alfalfa fields get some summer sunscald spots that kill the stand and need renovating. This is done usually in September and October. It's ready for pasturing within six weeks after seeding. Many farmers will plant barley as a nurse crop along with the alfalfa. Stockmen like this as it makes more pasture in these fields and lessens the danger of bloat.

Martin Rivera, a quiet, mustached young farmer, described his alfalfa renovation:

"We use a coil shank cultivator with an alfalfa attachment for breaking up the ground," he said, "then, we go over it with a spike-tooth harrow to work it down. We use a broadcaster to sow the seed. The Moapa variety of alfalfa is the best for this hot valley. It cost us fifty cents per pound last winter. It's resistant to spotted aphid and is a good yielder. We're late this year in getting it all in so we're sowing straight alfalfa. After the seeding, we go over the renovated spots with a cultipacker to work the soil down and make a firm seedbed. Then, we pour on the water. It's up in two weeks and ready for pasturing in six."

Phosphorus Fertilizer

Clay, who had been listening, wagged his finger, "Find a history of a good phosphate fertility program on a farm and you know you can raise good lambs there; they just do better." And this is backed up by the research men at the University of California. Phosphorus requirements for farm animals have been calculated at about 20 grams per 1,000 pounds of live animal per day. And each three tons of alfalfa takes out of the soil 140 pounds of nitrogen, 35 phosphorus and 135 potash.

Stockmen using alfalfa pasture have had little trouble with depraved appetite, bone- or wood-chewing, or eating of dirt. Some have tried supplementing with bonemeal but find that, if the farmer is supplying adequate phosphate fertilizer to his fields, the needs for this mineral are supplied. When the ratio of 2 to 4 parts of calcium to one of phosphorus is maintained a good balance exists. When the ratio gets as wide as 10 parts calcium to one of phosphorus in the animal body depraved appetites develop.

Roy Richtor uses 75 units of liquid phosphoric acid per acre. He applies this in his irrigation water. "This costs about $8 per

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County.....

acre," says Richtor, "and it not only increases the tonnage but it ups the protein content of alfalfa hay, boosting it from 14 to 18 percent, and it keeps the green alfalfa analysis right at 5 percent."

The Broadbent Livestock Company started to expand its California operations a few years ago by leasing Camp Roberts from the Army. Camp Roberts is situated on the line between San Luis Obispo and Monterey counties. This past year they lambed some 10,000 ewes on alfalfa fields leased in areas near Paso Robles in the South Central coast area.

"We've found alfalfa has to be handled differently up there. We have to watch sheep closer than in the Imperial Valley. We have to be sure to keep the ewes full. Never let 'em get empty," Clay said. "Up there the alfalfa does not grow as well, due to the colder weather so it doesn't mature as fast during the winter. But we're going to try finishing a bunch of lambs on alfalfa pasture around King City this fall."

Alfalfa growers and stockmen are watching the Imperial Valley pasturing techniques with increasing interest throughout the irrigated sections of the Western states. The lessons learned there may make it possible for the practice to become a popular and economical fall, winter, spring, or even a year-round reality in many areas.

ANAPLASMOSIS

(*Continued from page* 28)

riers are suspected. Hawaii has practically eliminated the disease from its borders by testing and slaughtering all carriers.

For years testing by the Texas Experiment Station of a highly infected herd in the Gulf Coast region has shown that 20% to 25% of the annual calf crops is infected.

It is possible to control anaplasmosis by isolation of the carriers. Two test herds at Texas A. and M. College, one composed of carriers, the other a group of negative reactors, have lived for several years in pastures separated only by a lane, and the disease has never spread from the carriers to the negative cattle. All sanitary precautions and insect controls have been carried out.

The disease is now found in some 26 states as indicated on the map on page 28. Southern ranchers have experienced heavy losses in breeding stock imported from the North. And stock movement cattle from infected areas of the South to Northern feedlots is certain to bring about further spread of the disease. It seems imperative that testing programs be made available soon and that these be followed by isolation or elimination of carriers. Until such steps are taken the individual rancher, farmer, cattle feeder or dairyman will have to apply diligently the control measures listed above.

FACE FLIES

(*Continued from page* 59)

"They rode the cattle all the way to the barn," Eddy said. "They stuck till each cow moved inside the doorposts. My new milkhouse has a lot of glass and is bright in the afternoon. Once the cows passed the barn door the flies made a beeline for the milkhouse. It made a perfect flytrap. We sprayed and collected over two quarts of flies a day. But killing flies is small potatoes. What I want is something to keep the flies off the herd while they are out on pasture."

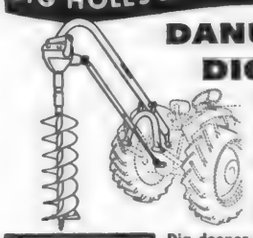
Two types of preparations have come on the market to give cows protection on pasture. One is a repellent, the other a fly killer.

The newest thing about repellents is an electric eye-spray applicator. It was devised at Pennsylvania State University and is coming on the market this season as the Mist-I-Fly Electric Eye sprayer, manufactured by the Milfred Company, 1516 Fifth Avenue, Pittsburgh.

The inverted-U-shaped unit is mounted framing the barn door. As the cows come in they are automatically sprayed from nose to tail. The sprayer operates only while a cow's body breaks a lightbeam under the sprayer —much like the fancy door-opening devices in supermarkets. Dr. Tien-Hsi Cheng, the inventor, said that after cows are driven through the spray three times, they are thoroughly accustomed to the shower. Dairymen can avoid spraying every other

DIG HOLES SITTING DOWN!

DANUSER DIGGER



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VEGETABLES:

How to use endrin and Phosdrin® Insecticide for season-long control of hard-to-kill insects—without creating residue problems

One endrin application lasts for days, sometimes weeks—controls the toughest insects. When insects attack close to harvest, switch to Phosdrin. It can be applied up to 24 hours from harvest because it works fast, disappears rapidly, leaves no residue.

Here is how to use endrin and Phosdrin for season-long insect control:

TODAY, vegetable growers are faced with a two-part insect control problem: How to get effective, long-lasting control of insects—*and still avoid having excess insecticide residue on harvested crops.*

Endrin, Phosdrin program

Many growers are solving this problem with a simple spray program based on properly timed applications of endrin and Phosdrin. Here is how they do it.

Control early and midseason insects with endrin

To get highly effective and long-lasting control of early and midseason insects, endrin is used.

Endrin controls a wide range of insects. A single application lasts 7 to 10 days or longer. On most vegetables, endrin applications can be made up to 14 days from harvest. On cabbage, broccoli, cauliflower and brussels sprouts, it can be applied up until the time edible parts begin to form, and on lettuce, up to 45 days before harvest. On potatoes, endrin can be applied up to 3 days from harvest.

Switch to Phosdrin for late-season insects

When insects attack close to harvest, Phosdrin is used.

Phosdrin is one of the newest phosphate insecticides. It kills the toughest insects fast, usually within a few minutes of application. Unlike most other insecticides, Phosdrin disappears rapidly after it has done its job, leaves no residue on harvested crops.

On many vegetables Phosdrin can be applied up to 1 day from harvest. See table below for more complete interval data.

Good mixers

Both endrin and Phosdrin are compatible with most other insecticides and fungicides.

Where to get endrin and Phosdrin Insecticide

Endrin and Phosdrin are available from your local insecticide dealer under many well-known brand names. Both come as liquids, dusts and wettable powders. Be sure, always look for the name *endrin* and the name *Phosdrin Insecticide* on the label or in the ingredient statement.

Shell Chemical Company, Agricultural Chemicals Division, 110 West 51st Street, New York 20, New York.

ACCEPTED INTERVALS FOR PHOSDRIN INSECTICIDE

CROP:	BEANS, ONIONS	CARROTS, EGGPLANT, PEPPERS	BROCCOLI CABBAGE & OKRA	BRUSSELS SPROUTS, CAULIFLOWER, COLLARDS, KALE, CELERY, BEETS (INCL. TOPS)	CANTALOUPES, HONEYDEW MELONS, MUSKMELONS, SUMMER SQUASH, WATERMELONS	CUCUMBERS, PEAS, TOMATOES, POTATOES	LETTUCE
Days between last spray and harvest	1	2	1	3	1	1	2

A Bulletin from

Shell Chemical Company

SHELL

Agricultural Chemicals Division

MEYER HAY CONDITIONER MAKES A *Champion!*

"Slow-Rolling" makes prize-winning hay in International Competition

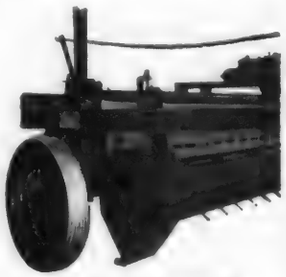
Lester Ray, Manager of Rolling Rock Farms in Pennsylvania, poses with ribbons and trophies won by his MEYER conditioned hay in international competition . . . including First Prize in the Pennsylvania Farm Show for the last three years.

Slow rolling is the secret of prize-winning hay on Rolling Rock Farms — and on farms everywhere! MEYER Conditioning Rolls revolve slower because *they do not have to pick up the hay.* The separate pick-up is a MEYER exclusive. It floats freely over rocks and terraces . . . lifts and feeds heavy or thin hay . . . on smooth or uneven, rocky ground.

Leaves stay on stems after passing through MEYER's exclusive, non-clogging steel rolls. Entire stem is cracked uniformly, with no splintered ends, to dry as fast as leaves. No crimping . . . no tearing off leaves . . . no shattering or crumbling. *More protein-packed leaves go into the bale . . . and into your livestock.*

Even with these advantages, a MEYER is priced lower. Get literature, prices and name of nearest dealer . . . send the coupon below.

CONDITION WHILE YOU CUT
MEYER Model No. 680 Hay Conditioner features exclusive, patented, side-mounted mower for cutting and conditioning in one operation. Windrowing attachment is available. Not shown, Model No. 675 is for use with your present mower.



ROLLS LAST LONGER
With a separate pick up, the conditioning rolls need not whirl at high speed to pick up hay. This means better hay . . . and longer-lasting rolls. **Note: only roll speed is slow — not ground speed.**

MEYER MFG. CO., BOX 9552, MORTON, ILL.
I'd like literature, prices and name of nearest dealer on the following MEYER Hay Conditioners:
☐ No. 680, with mower ☐ No. 675, without mower

Name_____ ( ) Student

St. or R.F.D._____

Town_____ State_____

I am also interested in MEYER Elevators: ☐ Belt Bucket ☐ Bucket ☐ Portable Auger ☐ Grain Dryers

MEYER . . . Makers of Famous MEYER Elevators

object passing through the barn door by flipping off a switch. The lightbeam from the electric eye gives the warning that the sprayer is turned on.

Dr. Cheng said in his tests, spraying every day gave him 70 to 80 percent face-fly control—which is about par for currently available insecticides. He added that there is a bonus from spraying when cows come into the barn—less fly trouble inside the barn. The spray also protects pasturing animals against flying insects other than the face fly and acts as a de-louser. There was no residue in the milk from spraying cows' bodies before milking when using the manufacturer's spray.

The spray comes in a 5- or 10-pound aerosol bomb with pyrethrins and fly repellent as the main active chemicals. The 5-pound bomb costs about $15 and contains enough spray for 300 to 400 dairy cows. The unit as a whole costs about $180, complete with the first bomb.

To spray cattle on pasture without supervision requires a battery-operated sprayer on a gate used daily by the cattle. An approach to the spot where they water is an example. A small herd can be driven through the sprayer. They'll move faster than languid dairy cows and a five-pound bomb will treat up to 500 head.

A cheaper way to apply repellent is with a sponge or heavy cloth wiped across the face of the cow. Eddy of New York state tried out a typical preparation which lowered his face fly count from over 50 to 9. He used Crag Agricultural Chemicals' formula LSO-35, which is marketed under various trade names for about $2.00 a gallon. To treat one cow takes about ½ fluid ounce per day, so a gallon of repellent used daily as directed on the label stretches over approximately 256 cows. The repellent can be stored up to two years without losing its potency.

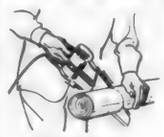
Fly Killers

Most repellents are not designed to reduce the fly population. Fly killers to which flies are attracted with a syrup bait can do this job

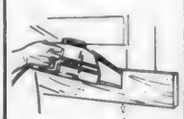
You'll find more uses for this saw than any other saw you can buy

USE IT FOR—

Ordinary Sawing


Cut Posts and Beams

Tree Trimming


Saw Flush With Support

THE WELLSAW 400
8" CAPACITY* HEAVY DUTY ELECTRIC HAND SAW

Here's a quality built tool that answers a wide range of sawing needs on the farm.

Building construction and repairs . . . Clearing brush and small trees . . . Tree pruning . . . Home butchering* . . . Cutting round baled hay (with optional knife blade) . . . and many others.

Safe and easy to use—weighs only 8 pounds—blade cuts on both strokes and stops in less than 1½ seconds after trigger is released. Husky 7 amp., 115 volt motor requires only 1000 watt generator away from electric outlets.

Your hardware or tool dealer has a Wellsaw 400 or can get one for you. See him today or write for descriptive Bulletin No. 402A.

** 16" capacity available for beef splitting and other big jobs.*

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416

WELLS MANUFACTURING CORPORATION
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better. Alfred Eddy had good results with DDVP (dimethyl-dichloro vinyl phosphate) in a carrier ¾ Karo syrup and ¼ water.

Eddy used a one-inch paintbrush to apply the fly killer—a common method for syrup or sugar water baits. He makes a single stroke six inches along the center of each cow's forehead. As he paints, he walks along the front of the stanchions and takes care of his whole herd in short order. Dairymen using a loose-housing system treat each animal just before she leaves the milking parlor.

Farmers say the first two weeks they treat cows every morning with a bait of the type put out by American Scientific Laboratories (Banafly), Myzon Laboratories, or Unico. After that they can provide relief by applying the fly killer once every second day or treating for 2 or 3 days and then skipping a day. A prepared mix costs about $2 per pint. It's best to buy limited quantities; ready mixes have a relatively short shelf life. A concentrate made up as needed costs less. A few weeks' supply can be made up at a time without fear of losing strength during storage. Figure on using about one-tenth liquid ounce per cow.

The cable rubber has been giving face fly relief to cattle that aren't brought into the barn daily—beef cattle or dry and young dairy stock. The swing-type back rubber won't work. To allow a face rub cattle need the triangular type.

Cattlemen advise setting up a cable rubber first in an unshaded pasture to teach the animals to use it. Once the cattle are acquainted with the device, they will use is frequently if it is located near shade and water.

A commercially-made movable oiler with a 20-gallon tank costs about $180. A homemade burlap-bag oiler costing around $12 in materials can give protection the entire summer with less than $3 worth of insecticides. Disadvantages are that it's hard to move and must be kept filled, which means a trip to the pasture with insecticide refill every four or five days and extra trips after it rains.

To avoid getting residue in the carcasses, keep slaughter cattle away from the rubber 30 days before sending them to market. The possibility of residues in the milk makes cable rubbers unsafe for

CHOOSE FROM NOT 1, NOT 2

BUT 3 NEW FORAGE MASTER SELF UNLOADERS
ONE FOR EVERY NEED

3 beater 72" sides 2 beater 48" sides 1 beater 21" sides

Whether you farm 50 acres or 500, there is now a Forage Master Self-unloading Forage Box to handle any job. Many farmers use 2 or even 3 boxes to adequately mechanize the feedlot and forage harvesting.

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MANGANESE
IRON
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Are your cows getting enough salt? Are they getting enough of all seven trace elements so essential to good health and top milk production? There's no practical way to tell for sure. Borderline cases of salt and mineral deficiency are almost impossible to detect—until they make production and profits fall off.

But we do know these two facts: most pastures are shy of one or more trace elements; and really high-producing cows must have extra salt. So why take chances? Offer your cows Sterling Trace Mineral Blusalt, free choice. It's necessary, easy to feed, inexpensive—excellent insurance for your herd's health . . . and for your own profits.

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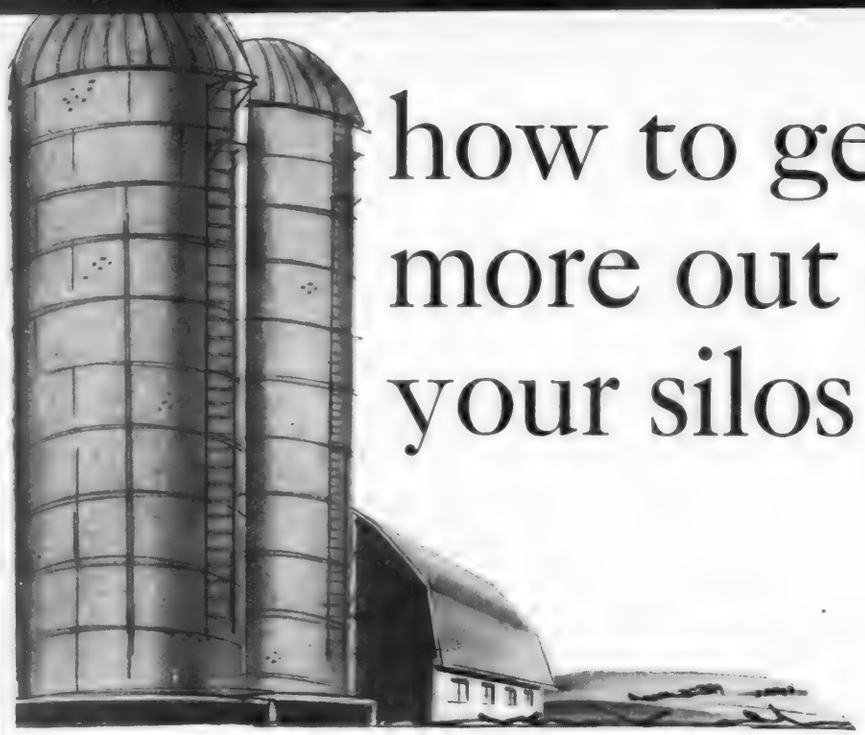

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only Kylage has double-action to assure superior-quality silage

Kylage is the complete silage preservative. It can be used *profitably* with any forage crop.

Kylage with its double-action works 2 ways. First, a scientific chemical mixture acts *fast* to expel undesirable trapped air. This stops harmful butyric fermentation and formation of foul smelling odors and gases. In the second phase, double acting Kylage liberates formic acid to create the correct acidity so that beneficial natural fermentation can proceed unhampered.

Kylage preserves more of the nutrients in all forage crops

The first few days after filling is when silage *quality* is determined. *Kylage works fast* to stop protein robbing (butyric) fermentation. As a result, silage preserved with Kylage is high in digestible dry matter, in essential energy producing sugar and carotene because natural (lactic) fermentation was allowed to proceed unaffected. In addition, an important end result of Kylage treatment is the formation of Calcium Lactate, a highly desirable feed constituent.

Kylage gives you scientific control of the quality of your silage

Kylage takes the guesswork out of silage making, whether you wilt your crop or prefer to ensile fresh chopped grass.

If you could accurately control *all* the factors that affect the quality of silage you wouldn't need a preservative. Sure you can make good silage, without a preservative, if all factors are *perfect* (weather, maturity of crop, moisture content, length of chop and many others) but if just one of these goes wrong, you're in trouble. The few cents a ton it costs to make sure of *high quality silage* with Kylage is a smart investment.

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Kylage does not affect clothes, tools or equipment. It is non-irritating to animals and humans. Kylage will not cake in storage, is free flowing and dustless. Kylage is easy to use by broadcasting over the load or with an applicator at the blower. And, it takes only half as much Kylage as is required with other chemical preservatives.

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Kylage has been tested by most State Colleges. We've had thousands of reports from farmers who have used Kylage over the years and practically 100% tell us results were highly satisfactory. They say, "Yes, we plan to use Kylage again next season.

Plan now to use Kylage this year

Ask your farm supply dealer or cooperative about Kylage. Place your order today.

Puts silage on a par with green grass

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DOUBLE ACTING
SILAGE PRESERVATIVE

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Send me latest KYLAGE literature and name of nearest dealer.

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CHEMICALS OF QUALITY SINCE 1905

NON-IRRITATING
STOPS SILAGE ODORS
PRACTICALLY NON-CORROSIVE
EASY TO USE

treating milking dairy cows.

Face flies move indoors to overwinter. Many a farm wife has swept a bucketful of stupefied face flies off her attic or kitchen floor. For relief, try DDVP at ½ percent strength in attics, around windows, or wherever face flies seem to enter.

Future Control

Research continues for longer-lasting or more effective fly killers or repellents. In Illinois tests DDVP got consistently good kill, whereas similar tests in Massachusetts ranged between 88 and 30 percent control. Insecticides now being tested will have a less spotty effect. More than doubling the currently-approved 0.2 percent strength of the DDVP gives better kill and appears safe. It is now going through final tests for federal approval, but at present a strength higher than 0.2 percent is *not* permissible. Dimethoate is one of the most promising compounds now being tested as a face fly killer by itself, or in combination with DDVP to extend the effect of a single application of insecticide. It will probably be on the market for the 1962 face fly season.

The ultimate answer to the face fly problem most likely is not in killing the adult, but in eliminating the larvae. The female deposits her eggs only in cow droppings less than one hour old. They will not use squashed or dried manure. This probably accounts for the fact that though Long Island, New York, was the location of the first reported discovery of the face fly in this country, Long Island dairymen have little trouble with this pest today. Because of space limitations, practically all of them feed in confinement, and the trampled manure in the cattle lots is unattractive to the face fly for laying eggs.

Eggs deposited in manure hatch in less than a day, and the larvae stay in the manure until they become adults 8 to 14 days later. Specialists are now working on a larvicide feed additive that would not harm the cow or show up in the milk, yet pass out in her manure in quantities strong enough to kill larvae.

This is a big order, but several materials already look promising. Some large cattle feeders reported last year that they fed finely ground phenothiazine in 10 to 12 percent molasses throughout the pasture season and had few flies of any type, including face flies. They had some trouble with cattle eating enough. Each animal must consume at least two grams (about 31 grains) each day or ½ ounce per week for proper larva kill.

Will larva control mean the end of every stockman's face fly problem? Obviously not, if he pastures his stock next to the line fence of a farmer who doesn't feed a larvicide. Entomologists say that no matter how effective the fly killer they develop, all the stockmen in an area must cooperate to wipe out the face fly, or it will pester their cattle and horses until the Fourth of July falls on the fifth of August.

Bad milk, off-feed, fever, abortion . . .

"Lepto" may be in your herd

Leptospirosis disguises itself by variable symptoms

Even an expert can't tell for sure by just looking

Your veterinarian may find it necessary to run special laboratory tests to confirm the diagnosis

Have your cattle ever suffered from a sudden unexplained illness—dull, off-feed, feverish, reduced milk flow, perhaps even abortions? The cause could have been the same type of disease that causes "abortion storms" in swine, "moon blindness" in horses, "yellows" in dogs, and a serious condition in man—namely leptospirosis.

Before anyone knew much about lepto in cattle, other diseases were often blamed for this condition. Now, however, it is known that leptospirosis is widespread among farm animals, wild rodents, and dogs. Your veterinarian can frequently make a tentative diagnosis by examining the animals and he can confirm his findings by laboratory tests. Call him at the first sign of trouble—don't risk the health of your animals or the safety of your family.

Threatens all animals . . . even man

Lepto is caused by a group of related microscopic infectious organisms that look like tiny corkscrews. They can spread from one animal to another in the herd—or even among different kinds of animals. The most noticeable sign of lepto infection is abortion. Others are fever, loss of appetite, drop in milk production, and the secretion of thick milk that may have blood in it.

How you can help keep your herd lepto-free

1. Get rid of rodents—they are frequently carriers of some types of leptospirosis as well as other diseases.

2. Prevent animals from wading in, or drinking from, stagnant pools of water.

3. Insist on a veterinarian's certificate showing that replacement animals are healthy before adding them to your herd. A "clean" blood test should be a must.

4. Isolate sick animals—especially if they have recently aborted.

5. Control leptospirosis in *swine*, since infected swine can rapidly spread the disease to other animals, including cattle and man. Ask your veterinarian about control programs, such as using high (therapeutic) levels of Terramycin® in the feed or Cosa-Terramycin® Fortified Soluble Powder in the drinking water.

6. At the first sign of trouble, call your veterinarian. Remember, it takes all three to control leptospirosis losses: your good management, your veterinarian and the modern products he uses.

Pfizer

Department of Veterinary Medicine
Chas. Pfizer & Co., New York, N. Y.
Science for the world's well-being®

ARTHUR YOUNG

(*Continued from page* 84)

Samford Hall he began a search for a new place. As he visited farm after farm he conceived the idea of a book describing the agriculture of the regions he visited. This resulted in his first popular publication, *A Six Weeks' Tour Through the Southern Counties of England and Wales.* This book answered a need in the world of his time for there was little or no agricultural writing which could guide the farmer. As Young said, "Practices which are found highly advantageous in one district are totally unknown in another; although the soil, exposure, climate, etc., be exactly the same. The farmers in one place grow rich by methods which would enrich their brethren in another; but remain quite unknown."

In the tour of the southern counties Young set a pattern for a number of other volumes of tours of different parts of England and Ireland. He would visit the great manor houses and castles in the area, giving a careful description of the grounds and the buildings with room dimensions, the arrangement of rooms and descriptions of furnishings and of the paintings that hung in the halls. Between these descriptions of great estates Young wrote of the successful farming practices in the area.

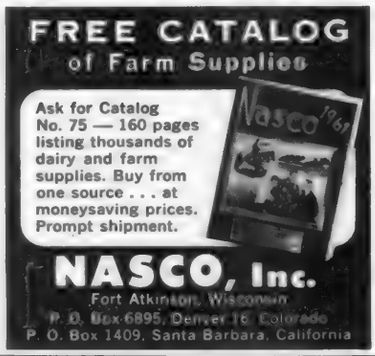
Young apparently chose this form in order to interest the gentleman farmer. The descriptions of paintings and great homes appealed to their aesthetic sense; the good agricultural practices were designed to appeal to their pocketbook. He hoped the gentleman farmer would put into practice some of the better agricultural techniques and the other farmers in the neighborhood soon follow. He despaired of reaching the common farmer with his writing because of the problem of illiteracy. He said, "I am sensible that not one farmer in 5,000 reads at all—but the country abounds in gentlemen farmers whose ideas are much more enlarged. . . . All the well-known strokes of husbandry are traced accurately to gentlemen: from whence comes the introduction of turnips in England? But from Tull. Who introduced clover? But Sir Richard Weston. Marling in Norfolk is owing to Lord Townshend and Mr. Allen. In a word, the most noted improvements were devised and first practiced by gentlemen; common husbandmen, in a long period of years, imitated the method in proportion to the success."

The practices which Young emphasized were the enclosure and improvement of land, the use of proper rotations in order to avoid fallow land, the introduction of new crops, and the spreading of the use of old crops, such as beans, peas, tares, clover, madder-wood, licorice, hemp and flax. The installation of covered drains made by cutting ditches and filling them with stone and brush and then covering them; manuring with marl (a soil heavy with lime deposits), chalk and animal manures; irrigation; and the improvement of agricultural implements to save labor and to reduce the number of draft animals needed to pull them.

In his description of a farm operation he invariably included the economics of the situation and these, perhaps, are the most interesting parts of his tours today. For example, he describes a farmer who, by enclosing moorland, changed "the wild sheep-walk into a rich farm cultivated in a most husbandlike manner." The rent of the land was two shillings, sixpence per acre. "Their course of crops (rotation) is—marl, and breakup for wheat. Two, turnips. Three, barley. Four, laid down with clover and ray grass for three years. They dung or fold for all their winter corn, and reckon two nights' folds equal to a dunging; the quantity of the latter to lay upon an acre is 12 loads.

"The farmer has 100 acres of winter corn, 250 acres of barley and oats, 50 acres of pease, 200 acres of turnips, 400 acres of grasses, and 100 acres of sheep-walk. He keeps: six servants, six laborers (servants were farm workers who lived in the farmer's house. Laborers lived in houses of their own or tenant houses), 30 horses. 20 cows, 900 sheep, and 5 ploughs. In harvest time he has in all about 40 people in the field.

"The estimated returns are: winter corn, £525 (£, one pound, was roughly $5); barley and oats, £900; pease, £240; sheep, £450; cows, £100; hogs, £50; for a total of £2,265. His expenses: rent, tythe, and town charges 6 shillings per acre, total £330.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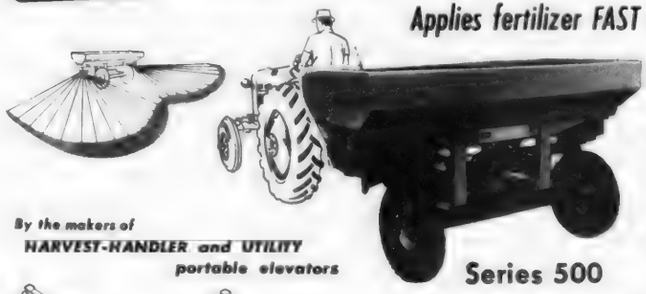

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Oats for his horses, £72 (though the oats were raised on the farm Young insists on their being noted as a charge). Seed for 400 acres, £180. Six servants, £120. Six laborers, £150. Wear and tear, say about £70. Harvest—4 shillings per acre, £80. For a total expense of £1,002."

He describes the cost of labor as: "In winter one shilling a day and small-beer. In spring one shilling and two pence a day and beer. Harvest, three pounds besides meat, drink and lodging. It lasts from a month to five weeks."

Though most of his writing emphasized good agricultural practices, he often took space to bitterly condemn wasteful, slovenly farming. In writing of eastern England in one of his tours he said, "About this country . . . they have a most execrable custom of collecting all the cow dung from the fields, and kneading it up with short straw to burn instead of coals. . . . Will ye believe me, ye farmers of Norfolk, Suffolk, Essex, Kent and Hertfordshire, that this is the constant practice not only of cottagers, but of the farmers themselves! No; you will say: It is impossible; there cannot be such an application of manure anywhere but among the Hottentots. I looked attentively at the inhabitants to see if the guts and garbage of the cows were not very capital ornaments for their persons."

Much of what we know of the great animal breeder, Robert Bakewell, comes from Young's writings, for it was inevitable that he should visit Bakewell's farm, Dishley.

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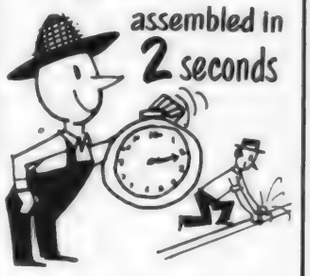

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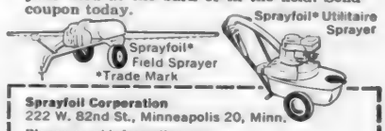

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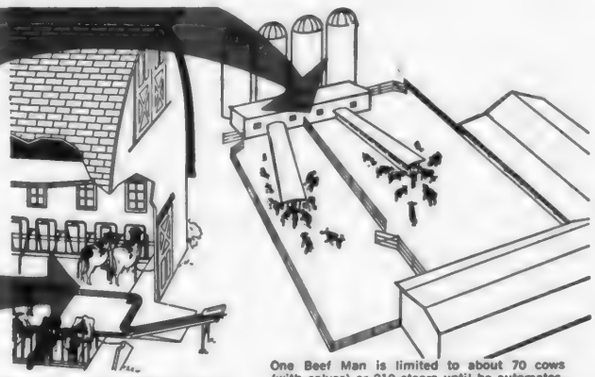

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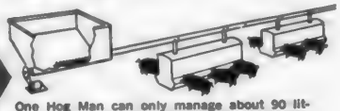

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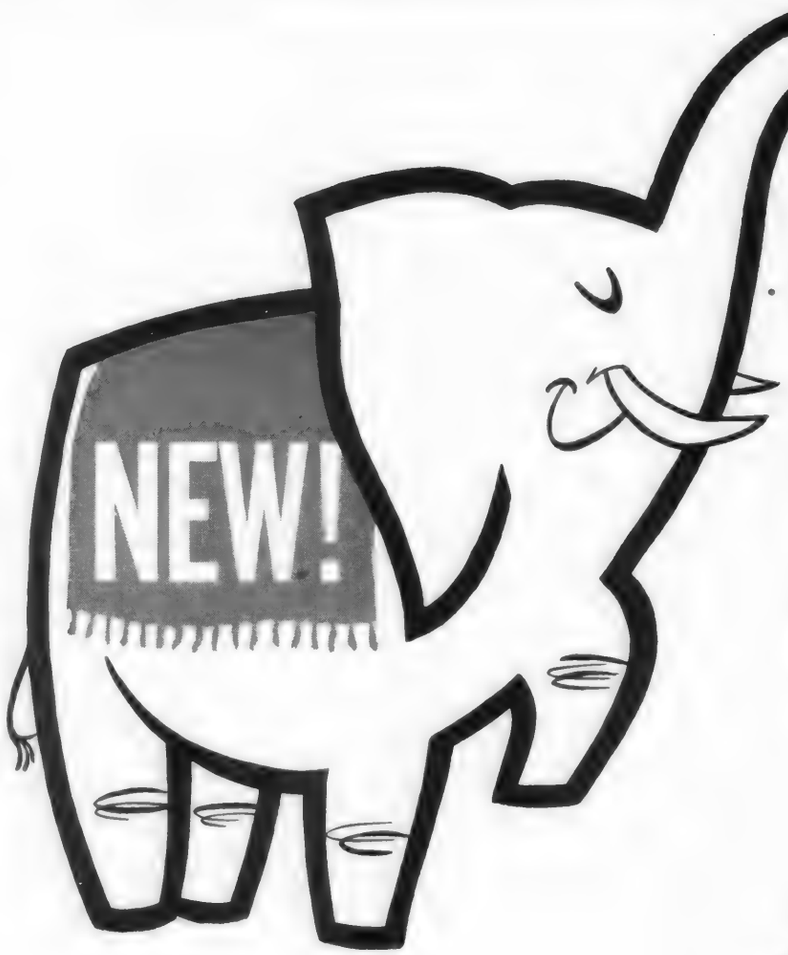

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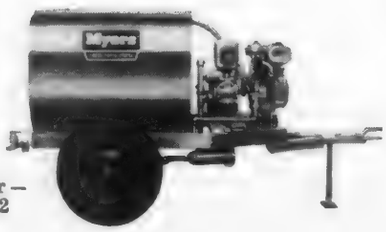

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There he heard Bakewell expound his ideas of production testing for breeding to produce animals which were useful rather than either ornamental or simply big. "Flesh, not bone, is the butcher's object," Bakewell told him. Bakewell showed him the famous bull Twopenny, which Young described as "a fine bull most truly made which leaps cows at 5 pounds, 5 shillings a cow." He saw the barns which Bakewell designed with a manure gutter to eliminate the need for bedding, since Bakewell fed all of his straw. He described Bakewell's irrigation practices and the ingenious use made of his irrigation canals to float turnips, cabbages and barges of other farm products down to his barn. He also included a drawing of a wheeled feeder which Bakewell had designed, which could be pulled through the fields to feed colts on pasture, or to feed workhorses in the field rather than bring them back to the farmstead at noon each day.

In his travels Young was always on the lookout for the experimentalist. A farmer who tried new row spacings or combinations of crops always received his attention. Occasionally his uncritical enthusiasm shows through, as when he wrote of Mr. Wharton who "plants only the knots or eyes cut off the potatoes: the heart is all preserved for use."

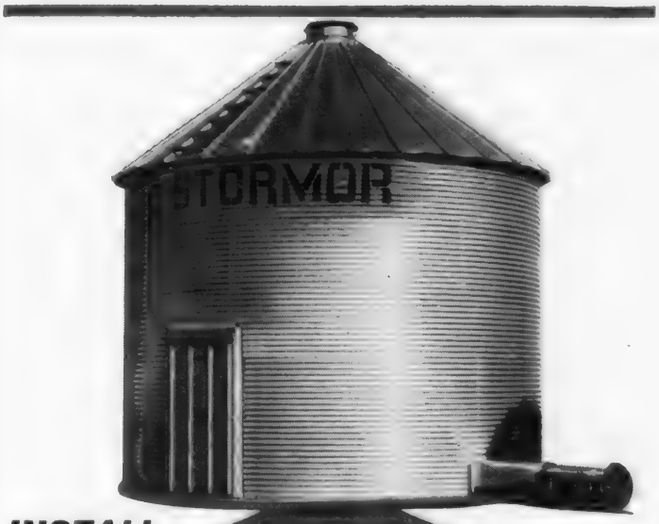
Interspersed with his several books of tours of England and Ireland, Young wrote many other books and pamphlets on agriculture and its problems. He was one of the first to urge the national census as an accurate guide to the solution of national agricultural and political problems. He made studies of the enclosure and the productive use of wastelands, of tariffs and bounties, and of political economy. In 1784 he began the publication of *Annals of Agriculture,* a monthly publication about a third of which consisted of his own writing. He attracted, however, some of the great minds and great men of his day as contributors. One of his contributors who wrote under the name of Ralph Robinson, was known to all the readers as King George III. Other contributors included Joseph Priestley, the discoverer of oxygen; Jeremy Bentham, the political philosopher; Coke of Holkham, the great farmer, and such other notables as Lord Townshend, Lord Orford and Lord Bristol. The *Annals* appeared regularly for the next 25 years, until 1809, and eventually made up 46 volumes of agricultural writings.

Travels in France

Young's fame brought him many visitors and students, among them Francois and Alexandre, the sons of the Duke de Liancourt, and their tutor Maximilien Lazowski. Later Lazowski wrote Young inviting him to make a tour of France with members of the family of the Duke de La Rochefoucauld. The invitation was too tempting to resist and led to not one, but three trips to France, which covered the periods May to November, 1787; July to October, 1788, and June, 1789, to January, 1790. These trips, made on the eve and during the early stages of the French Revolution, gave him the material for *Travels in France,* which remains one of the most readable, and certainly the most historically interesting, book of the many he produced.

In preparing his book for publication Young was prevailed upon by a friend to keep it in the form of the journals which he made daily during his visits, and so instead of a dry treatise on agriculture and politics, we have the lively account of his travels, the miles he covered each day, the sights he saw, the knavery of the innkeeper at Nemours, who had the gall to charge him 19 livres 8 sous (approximately $3.60) for a night's lodging for himself and horse, plus dinner, which consisted of soup, a partridge, roast chicken, celery, cauliflower, two bottles of wine, cake, and four apples. He wrote daily observations of agriculture, and his impressions of French people which ranged from peasants to whom he talked, to Lavoisier, the father of modern chemistry, Mirabeau, Lafayette, and Louis XVI. His reputation and his connections in France opened doors to him everywhere. On June 18, 1789, for example, he attended the meeting of the Royal Society of Agriculture, where he gave his vote for the election of General George Washington as an honorary member. He was in France when the Bastille fell and it was his friend, the Duke de Liancourt, who announced this event to the King.

A constant thread that runs through his description of France of



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this period is the tremendous influence upon the French of the American Revolution. And always Young, the agricultural writer, emphasized the farming practices and their influence on the nation. He found them appallingly bad and the position of the farmer almost unbelievably oppressed. As an example, he wrote again and again of the practice of *Capitaineries*. This consisted of the King giving to royalty vast areas in which they were sole proprietors of all game, even on lands which did not belong to them. And by game was meant whole droves of wild boars, herds of deer, great flocks of partridges and the like. The noblemen were permitted to make what rules they wished, to protect their hunting rights. The peasants were not permitted to weed or hoe their gardens for fear the young partridges might be disturbed. Manuring their ground with night soil was prevented for fear of flavoring the partridges which might eat the corn grown on this land. Hay could not be cut before a certain time of the summer because it would deprive the birds of shelter. Seeds could not be steeped for fear game birds scratching them up and eating them might be injured.

Rents were exorbitant and taxes high. Salt, for example, carried a high tax and each person in the kingdom was required to consume a certain amount of salt each year. Smugglers of salt who were armed were sentenced to death. Unarmed smugglers were sent to the galleys for from three years to life. Stealing salt was punishable by flogging or hanging.

The *corvee*, a system by which a nobleman might demand labor from peasants in his district, was in full practice. Hundreds of peasants each year were ruined because their labor was conscripted for the corvee and they were unable to produce their crops.

The picture that emerges from Young's writing of the vast wealth, irresponsibility and oppression of the ruling nobility makes the revolution which took place seem not only inevitable, but long overdue.

The Board of Agriculture

Shortly before Young left for France his mother died, leaving him her entire estate. His older sister had died when he was a young

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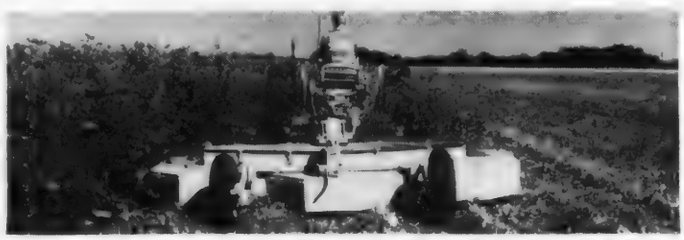

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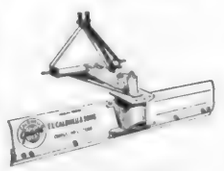

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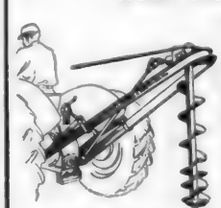

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man, and his older brother, John, a Doctor of Divinity, had broken his neck while riding a borrowed horse in a fox hunt organized by King George III.

His inheritance eased his financial situation which was further improved by the formation of the Board of Agriculture in 1793 and his appointment as Secretary with a salary of £400 a year. Young continued to publish his *Annals*, to prepare agricultural surveys of the different counties in England, to write political pamphlets on subjects affecting agriculture, to visit important, progressive farmers in England, and even began the work on a giant 10-volume history of agriculture.

His homelife, which had never been a happy one, had one bright spot for him, his children, Arthur, Elizabeth, Mary and particularly his youngest daughter Bobbin. In 1794 he was deeply grieved when his daughter Elizabeth died, but three years later his life was shattered by the death of his beloved Bobbin. He continued his work, but he changed from a charming, gay, outgoing person to a retiring, gloomy man, who must fight constantly against fits of the deepest depression.

His eyesight began to fail due, his friends thought, to excessive weeping. In 1811 an unsuccessful cataract operation left him totally blind. He moved from London to Bradfield where he remained the rest of his life.

Even in his blindness he continued working with a secretary on the history of agriculture, though perhaps his major interest during this period was religion and preaching to the people at the parish. At about this period he took a diamond-encrusted snuffbox which had been sent him by the Empress Catherine of Russia, had the diamonds removed and gave them to the Rev. William Wilberforce to finance his drive against slavery. Slaves, Young felt, were the most oppressed of all agricultural workers and a hindrance to progress. He died April 20, 1820, still firm in the belief that "no country possesses so bad an agriculture, but something useful may be learnt from it."

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Says: Harold Lausted
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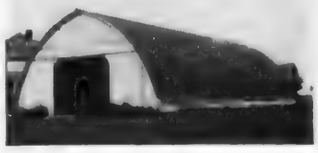

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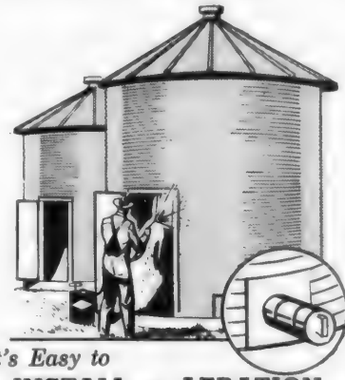

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PROTECT Your Grain with Douglas PREVENTIVE MAINTENANCE

It's easier and cheaper to PREVENT insect infestation than it is to stop it **after** it's started. Ask your dealer about our complete Preventative Maintenance Program.

It's Easy to
INSTALL an AERATION UNIT in Empty Clean Bins

Aeration saves you money. PREVENTS moisture migration, condensation, hot spots, crusting. STOPS mold growth, insect activity.

Douglas has an Aeration Unit for EVERY Size Bin

45 years professional experience in Grain Sanitation.

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Control blood sucking parasites . . . lice, flies, mites, gnats, mosquitoes and mange with your choice from the **CURRY-LINE** of cattle oilers. Imagine cattle currying their hair while gaining positive parasite control. Cattle using **CURRY-TROL, CURRY-FLEX** or **CURRY-TUBE** do! They apply insecticide where the cattle want it . . . when they need it . . . immediately. Cattle do all the work "doing what comes naturally" . . . scratching on the oilers rather than fences, feed bunks or buildings. Complete your parasite control family with **PYRONOL INSECTICIDE** . . . specially formulated for the **CURRY-LINE.**
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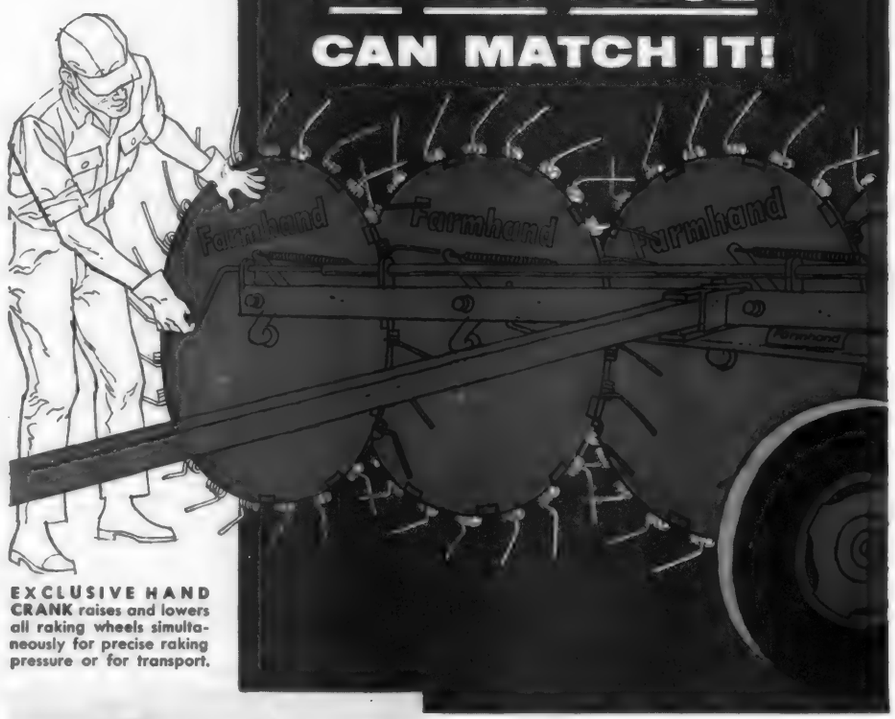

EXCLUSIVE HAND CRANK raises and lowers all raking wheels simultaneously for precise raking pressure or for transport.

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UP TO $100 LESS than any other rake . . . no PTO, gears, belts, pulleys or ratchets to cause problems . . . cleaner, gentler raking to give you more and better hay. It takes a 7′ swath, rakes equally well in light or heavy hay, rakes cleanly over rough or rocky fields, ditches, contours or borders. Adjusts, without tools, to offset up to 5′ to keep tractor wheels off hay. Ask for a demonstration soon!

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SEA FARMING

(*Continued from page* 73)

at from $2 to around $2.50."

As the kelp drops over the conveyor ladder into the hold, a rake grabs huge bites, and hauls them aft. This goes on until the kelp heaps high like a gigantic bowl of sauerkraut.

"It takes a four-man crew to run this kelp harvest," Captain Hodge explained. "One crewman watches the cutter bars, lowers the frame in and out of water and checks the operation of the conveyor ladder. Another handles the winch and rake to pull the kelp to the rear of the boat. Another tends to the engine and checks on movable parts. I stay in the pilot house and steer the ship through the kelp beds and try to cut an even swath."

When the C. L. Arques docks at San Pedro, berth 42, a huge fork swings into action from a crane to unload the kelp. In large bites it picks up a load, swings over and dumps it into a huge wooden hopper. From there it slides into a chopping machine, to be ground up and pumped into a large storage tank. It is then pumped into hugh rotary gas-flame dryers, where most of its 90 percent water content is evaporated. Of the remaining 10 percent, one-third is minerals. It comes out of the dryers in the form of tiny, dark green flakes with a pleasant, salty taste. At this stage, it is valued at about $150 per ton. It is then sacked and sent to Fontana, where it is blended into animal and human food products.

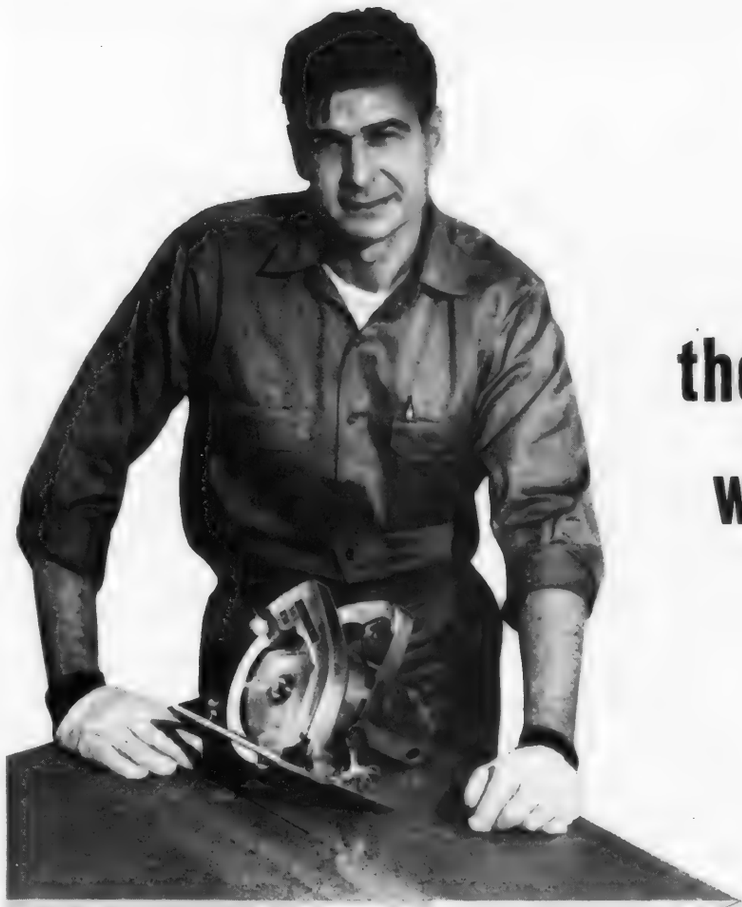
The Kelp Plant

Giant kelp is a descendant of plants which survived the ice ages. Thus it thrives best in cooler waters. In temperatures above 75 degrees F., whole beds have been known to disappear. The plant requires sunlight for photosynthesis to take place. Dense shade impedes growth; thus removing the top four feet of mature growth allows the sun to reach the young plants.

The giant kelp has an unusual reproductive cycle that is little related to land plants but more like animal sperm fertilizing the ovum. Microscopic spores, minute bodies that develop into new individual organisms, are released throughout the year from the lower fronds of the plant. These spores swim, and have a 24-hour life span in which they must attach themselves to some hard surface. If they fail to do this, they die. Once attached, they germinate like a seed and grow rapidly into tiny filament-like plants. Even when fully grown, they are far too small to be seen without a microscope. Attached to a rock these tiny plants, some male and some female, go through a second stage of the life cycle.

Eggs the female plants produce are fertilized by free-swimming sperm grown and released by the male plants. By cell division these fertilized eggs grow at a rapid rate. In a few months, they grow several feet and in a year will have become the giant kelp.

Giant kelp is not fed by roots. It has a rootlike structure called a "holdfast" with



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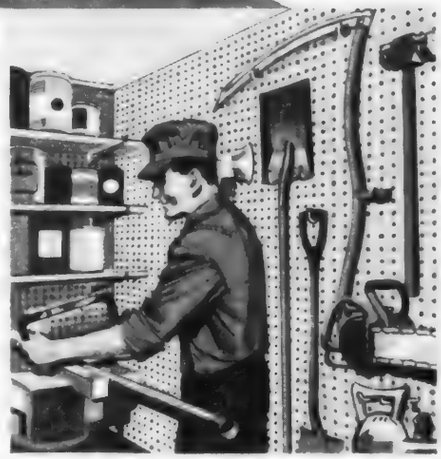

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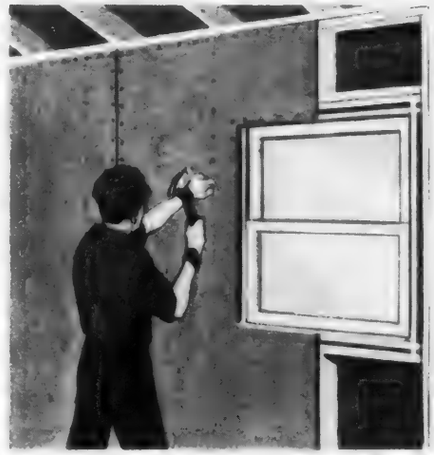

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which it clings to any hard, rough object. Kelp absorbs nutrients from all its surfaces. Hence, it grows luxuriantly in strong currents where there is a constantly renewed supply of the food necessary to the plant.

Harvest of the giant kelp beds has been under the supervision of the California Fish and Game Department for many years. The state makes a charge of ten cents per ton for kelp unloaded at the docks.

The Marine Resources Operations Branch of the Fish and Game Department began a study a few years ago in an effort to increase the game fish numbers by providing more suitable ocean fish habitats.

Divers found desert areas on the ocean floor with little visible marine life or seaweed. Along the southern California coastline they found the rocky bottoms provided the footing for the kelp spores to get rooted. Among the underwater kelp bed forests the divers found the waters teeming with sea life such as bass, perch, yellowtail, barracuda, and countless other fish.

To transform the ocean deserts into kelp forests, they plant old street car- and automobile-bodies along the flat mud bottoms a mile or two offshore.

Divers attach young kelp plants to these car bodies to establish new kelp beds. Game fish are attracted to the dark interiors of these car bodies, and the kelp beds for food and habitat help attract and grow more fish. And, after the kelp beds are firmly bedded and the growth reaches the surface, harvesting companies will have additional fields.

The principal giant kelp beds in American waters lie off the coast of southern California. They cover about 400 square miles with an estimated 60,000,000 tons of kelp growing annually.

"Several factors that affect the kelp plant adversely besides mechanical damage caused by storms is the sea life grazing too heavily, similar to overpasturing a meadow on a farm," stated John Carlisle of the California Fish and Game Department at San Pedro. "Also, organisms disturb the holdfasts such as the burrowing isopod and a condition known as blackrot which occurs during periods of high surface temperatures and which is thought to be caused by bacterial action."

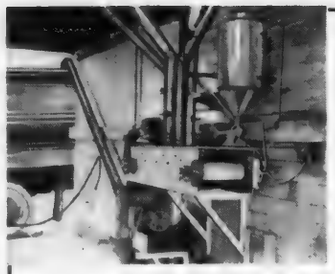
The total harvest of kelp in 1956 was around 75,000 tons—twice the tonnage of 1947. Yet, in aerial surveys carried out in 1955, '57 and '58, no decrease was noted in the size or number of chartered kelp beds.

The greatest recorded production from the California coast was 395,000 tons during the First World War when it was used as a source for potash, second only to natural brines. Kelp harvest along the Atlantic coast is around 4,000 tons annually.

Development For Feed

In 1926 Philip Park started his project of developing a mineral and vitamin-rich food supplement from this "sea alfalfa."

With Miss Gertrude Beckwith conducting rat feeding experiments, they feel they proved the kelp an excellent livestock feed supplement. Through the next few years



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Philip R. Park, Inc., saw the infant kelp-feed business grow in spite of stiff competition from old line feed corporations. The mineral-rich dry kelpmeal concentrate developed was mixed with alfalfa meal, cane molasses, phophates, oyster shell flour and protein-rich products to make a concentrate that livestock feed manufacturers use to reinforce grain and hay rations with protein, minerals and vitamins.

Park and Miss Beckwith named their new animal feed Mannamar. (Manna—feed, Mar—from the sea.) Its use is widely known in dairy, beef, swine and poultry feeds, and retails for around $7.50 per hundredweight.

In his book, *Cowphilosophy*, Mark H. Keeney of Essex County, New Jersey, says dairymen who mix their own grain rations can improve them by including nutritional factors that may be inadequate in home-grown feeds. For several years he fed his dairy herd a ration of 400 pounds ground oats, 200 pounds yellow corn, 200 pounds wheat bran, 100 pounds linseed meal, 10 pounds salt, and 100 pounds Mannamar.

Keeney pointed out the seaweed meal and other marine products will supplement the minerals of land grown crops for dairy cows, and further provide a balance of high-character proteins and vitamins.

Dr. C. K. Tseng of the Scripps Institution of Oceanography at La Jolla, California, said kelpmeal is used extensively as livestock feed because it contains large amounts of various minerals and vitamins A, B, C, and G. He recommends them as supplementary feeds for mixing with grains and other rations.

On the other hand, Dr. Robert D. Appleman, Extension Dairyman of the University of California thinks that much of the praise of kelp feeding is mistaken. He says the economic value of kelp has never been supported by sound research. He referred to a Maryland University feeding trial where no significant difference was found in kelp feeding. He said more than 30 reports of research in seven states and two foreign countries have been reviewed and none suggests the feeding of kelp to be advantageous.

Dr. Appleman believes we have cheaper sources of vitamins, potassium and calcium and that iodine can be supplied cheaper in salt. "If hay is worth $30 per ton, kelp is profitable as a source of energy only if it can be bought for less than 86 cents per hundred. It would be an economical source of protein at 35 cents per hundred," he said. Appleman pointed out that kelp has nutritive value no greater than that of a mixture of seven parts oat mill feed and one part iodized salt.

Dr. Park, of course, disagrees with these conclusions. He believes that the giant kelp, grown in a perfect nutrient bath, the ocean, provides trace minerals and unidentified growth factors which cannot be measured.

And so the tide of controversy and of feed competition rises and falls while the sea continues to swirl and grow kelp, unmindful of the disagreements of men.

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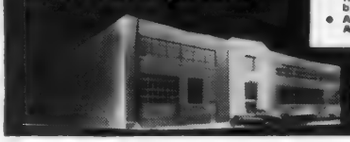

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A.I. IN SWINE, TODAY

(*Continued from page* 57)

for whatever hole he may have to fill. To run his swine A.I. project he selected young Tom Fleckenstein, a bright, ex-jet pilot and football player. Tom holds an ag degree from Iowa State University, but his basic training and inspiration came from working with "Doc" during his summers in college.

Tom is in complete charge of the swine A.I. project, meaning, in this case, that he actually collects the semen and inseminates the sows as well as performing all the other work connected with the project. He has never inseminated a cow (Pirie does not believe in having the same man work with both cattle and swine;) but he has probably inseminated as many sows as any other technician in the country—something over 500 at this time.

One of the fundamental problems with swine A.I. is finding the sows and gilts in heat. Fleckenstein has some practical advice on this. On a farm which keeps its own boar, the females will gravitate to the side of the pen closest to the boar. But apart from that there are the other signs, riding, the condition of the vulva, and the female's standing when pressure is put on her hips. The latter, Fleckenstein and others who have worked with A.I., feel is the best indicator. If, when downward pressure is exerted on her hips the gilt or sow stands and picks up her ears, she is very likely in heat. With animals that ride each other it should be remembered that it is the one which stands for riding which is definitely in heat though the other one, too, may very likely be in the same condition.

The actual insemination is a relatively simple matter. Farmer-clients of Eastern Iowa Breeders are advised to call the office before 9 A.M. if they have an animal in heat. The semen is collected, diluted to four billion live sperm per service, and packaged in a 50 cc. plastic bag which in turn is packed in an insulated box in which it is kept at about room temperature.

No elaborate facilities are needed on the farm. The individual to be bred should be identified and kept in a dry place. Water should be available for the technician to wash. Little or nothing is needed to restrain the sow. If she is in heat it will be difficult, if not impossible, to drive her, but pressure on the hips is sufficient to hold her. The insemination is made with a plastic inseminating rod of the same kind used for cattle.

After the sow is bred a tag is put in her ear and farmer and inseminator hope for good results.

A five dollar fee is charged for the service. This includes returns.

Both Fleckenstein and Pirie are reluctant to put any definite figure on the result of their work. "We hit with six out of eight sows in our very first attempt back in April of last year," Fleckenstein says, "and out of the first 107 we bred we got 52 litters with an average of 9.7 per litter. That's almost a 50 percent conception rate, which they tell us is just about par at this stage. But we

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Dewey Casto, Jewell, Iowa, has had a GM 4-71 Diesel on his Melos feed grinder since 1957, with no repairs to date. But he had eight gasoline engines under the hood of his truck in 2½ years and spent an average of $115 a month for repairs. He repowered the truck with a 4-53 Diesel—now gets better than 15 m.p.g.—and after a year of operation, no engine repairs have been required.

Carl Luther, Greeley, Colorado, gets one-third greater production at one-half the operating cost since he replaced the gasoline engine in his Fox forage harvester with a GM 4-71 Diesel. The 4-71 powered unit cuts up to two acres of corn per hour—cutting and chopping two rows at a time. Mr. Luther says, "Pull the throttle on this 4-71 and you cut at a steady 5.6 m.p.h. with no slow-ups, stoppage or gear-shifting."

S. A. Fitts, Cascade, Virginia, repowered his 1956 flatbed with a 4-53 Diesel—is getting 13.2 m.p.g. running 25,000 miles a year with 12,000-15,000 lb. loads. Mr. Fitts manages three farms, uses the truck to haul heavy machinery, cattle, farm products and fertilizer. He picked the 4-53 because of its compactness and high r.p.m.—reports his operating costs are cut in half.

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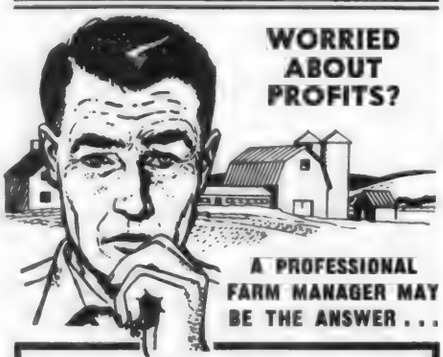

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wouldn't guarantee we're doing this good all the time. Some farmers may not feel sure about a sow after she has been inseminated so they turn her in with the boar. On-the-farm work can never be subjected to the same controls as the laboratory or the experiment station, so you're never too sure about your exact results. So long as you get a good reaction from your clients, though, you know you're doing all right."

Another encouraging indication that they are on the right track came to Pirie's attention late in January this year when six hogs from an artificially-bred litter and six from a naturally-bred litter, all from the same farm were slaughtered and submitted to carcass tests. The dams of these two litters were littermates. The results were as follows:

	Naturally bred	Artificially bred
Age	171 days	150 days
Weight	223 pounds	221 pounds
Dressing percentage	69.9%	69.5%
Length	29:5 inches	30.8 inches
Back fat	1.7 inches	1.5 inches
Loin eye	3.6 sq. in.	3.8 sq. in.
Total ham and loin	34.3%	37.4%
Grade	2—#1 3—#2 1—#3	5—#1 1—#2

The artificially-bred hogs were by a high scoring Hampshire boar and out of a crossbred sow. The others were by an unregistered boar out of a crossbred sow.

Checks such as this are, of course, the real test of A.I. Dr. Self points out: "Unless we can improve swine by making better boars available there is little point in A.I."

Which brings us to the part the boar plays in the A.I. program. All the boars in the Eastern Iowa Breeders stud are either high scoring individuals from test stations or have sired litters which have done well in cut-out tests. Before being put in service they are bled and tested for possible diseases.

Semen collection is made by means of a dummy sow—a mere metal rack covered with a sow hide—and an artificial vagina. At this point the boars demonstrate their extreme individuality. "No two are alike," says Fleckenstein. "Methods that work with one might be just exactly the wrong approach with another. When we first started we thought it might be smart to use young boars which had never served a sow before. We found we were 180 percent wrong. Those young boars had no idea what it was all about." Some technicians, though, prefer to train young boars.

Here, too, is where one of the big contrasts with cattle shows up. Whereas the bull gives from 5 to 8 milliliter of semen containing 800 million to 1.5 billion sperm per milliliter, the boar gives 200 to 500 milliliter of semen containing upwards of 200,000,000 sperm per milliliter. Very young boars, however, may produce no more than 40 to 50 milliliter.

The boar semen is strained immediately after collection to remove a gelatinous portion which would seriously interfere with

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Dr. Naylor's MEDICATED Teat Dilators

artificial insemination. The semen is checked for motility—not just a matter of determining whether or not the sperm are active, but how active and what the characteristic of the motility is. Then it is fractionated and diluted.

Most of the research work in this country seems to indicate that 2.5 billion sperm per service are sufficient. E.I.B. uses 4 billion. Their diluter is 7.5 percent egg yolk, 42.5 percent skim milk, and 50 percent glycine solution. To this is added one million units of streptomycin.

An interesting feature of the work now in progress in Ohio is an attempt to breed sows with greyhounds. The idea really is not as wild as it sounds. The boar stud is at Ohio State University in Columbus. Central Ohio Breeding Association and Northern Ohio Breeding Association technicians perform the insemination work in 12 counties which can be reached directly from Columbus by Greyhound bus. After the semen is collected it is fractionated, diluted (the diluter is egg yolk, glucose and glycine to which penicillin and aureomycin are added) and refrigerated until is is sent out. One hundred cc. are used per service. For delivery the plastic bottle containing the semen is packed in a cardboard box provided with facilities for refrigeration. The box is taken to the bus terminal, placed on the bus and delivered for use within 20 hours of collection. The fee for the service is $7, which includes returns and follow-up work for records on the performance of the litter after farrowing.

Conception rates seem to be good, but as of press time it was still too early for any farrowing results.

A technique closely related to artificial insemination is controlled estrus. If we can bring a bunch of gilts or sows in heat all at the same time and get them all bred at once, the argument goes, we can really get this hog business down to a fine point. Actually, controlled estrus is a real problem only with gilts. As every hog raiser knows, estrus can be controlled in sows by the simple matter of taking the pigs off the suckling sow. Three to five days later she comes in heat. So the gilts are the problem. And while encouraging progress has been made, the problem still has not been solved. But results, so far, have come from inhibiting estrus by the use of progesterone, either as an injection or in the feed, then cutting out the hormone so the entire group of gilts come in heat at the same time. The technique has not been refined to the point where it is ready for farm use.

The particular hormone used in one recent piece of work on estrus control is 6-methyl-17-acetoxyprogesterone, a compound which goes under the trade name of Provera. It is available at this time only for research purposes. According to John E. Nellor of the Endocrine Research Unit, Michigan State University, "it was found that .4 to .6 mg. of Provera per pound body weight daily, fed as part of the normal ration, was capable of completely inhibiting

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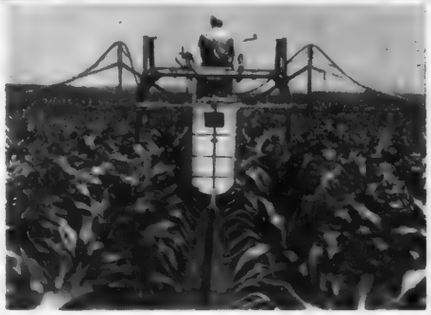

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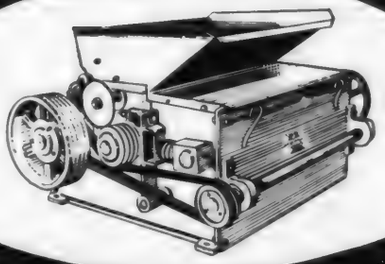

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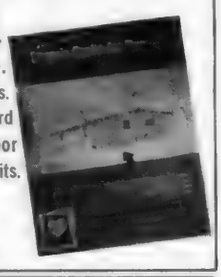

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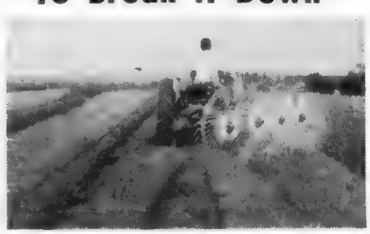

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follicular development in the ovaries and estrus behavior during the 15 to 24-day treatment period. A large majority of the gilts came in estrus and ovulated 4 to 5 days after the end of treatment; that is, when the compound was no longer added to the ration.

". . . Approximately 87 percent of the treated gilts came into estrus . . . and 78 percent of these conceived on natural service. There was no increased incidence of ovarian abnormalities subsequent to treatment with the levels described, although cystic ovarian conditions can result when Provera dosages are too high or too low. The estimated ovulation rate at the controlled estrus was 14.5 per gilt. Gilts not conceiving at the controlled estrus returned to estrus 19 to 25 days from the controlled estrus, and fertility was very high at this later estrus."

Pro and Con

Dr. Self has put together a good list of the advantages and disadvantages of artificial insemination in swine. On the positive side are the following:

a) It can be a big help in reducing the spread of disease at breeding time.

b) Small sow herds will be able to make use of the service of good production-tested boars at a reasonable cost.

c) Outstanding boars can be bred to more sows.

d) It can speed up the production of meat-type hogs.

e) It can reduce the investment in boars and boar handling facilities on the individual farm.

f) It makes it possible to breed very large boars to young or small gilts and sows.

g) Because of the examination of the semen it eliminates sterile boars or those of low fertility.

h) It will complement multiple farrowing.

i) It could lead to greater uniformity in the type of the market hogs within a given area.

j) It could lead to the keeping of better breeding records.

Among the disadvantages are these:

a) Too few females can be bred per boar at the present time.

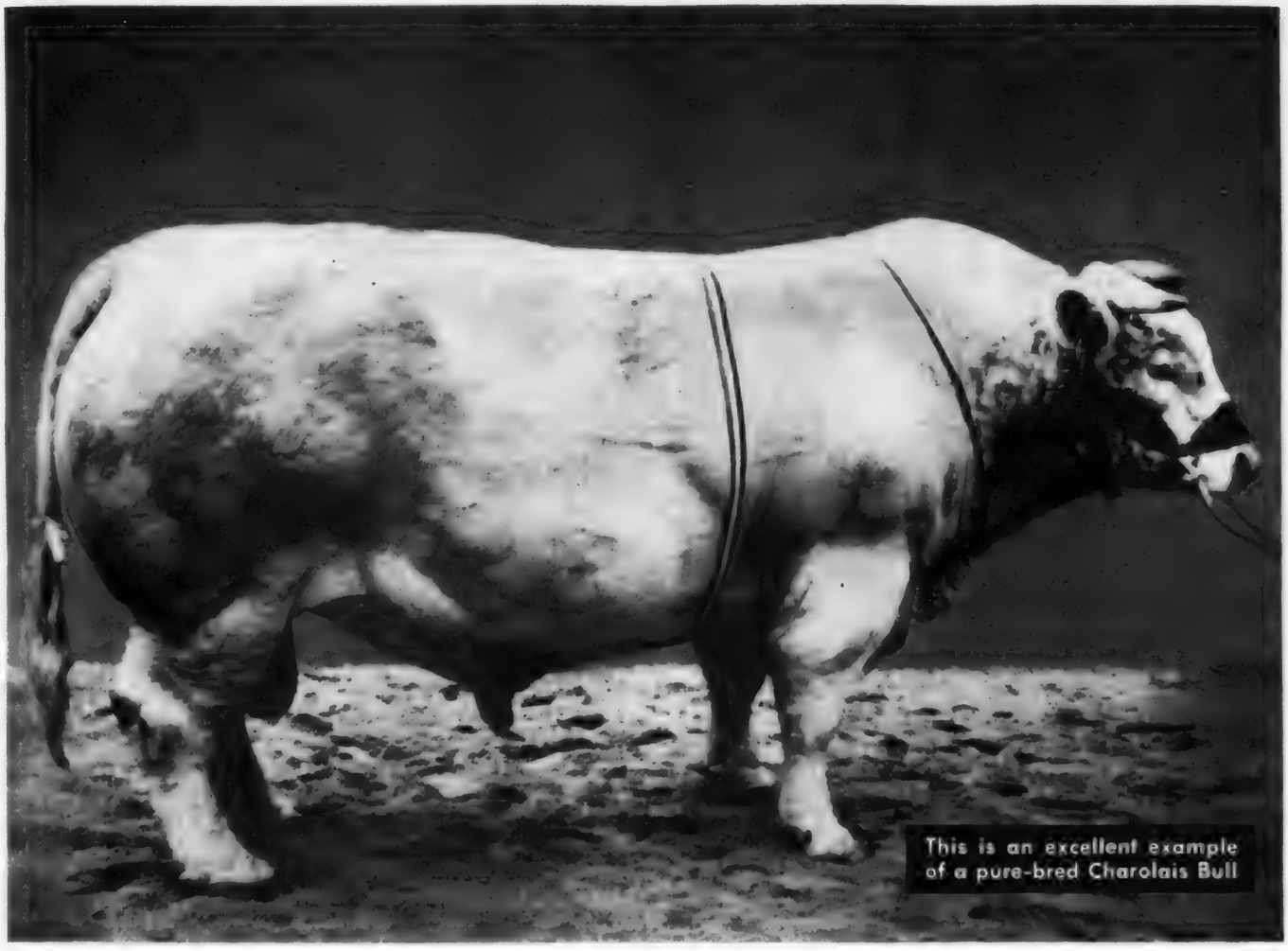
b) Until the semen can be stored for longer periods of time the semen from any particular boar is not available from one collection to the next.

c) We still know too little about the proper time for breeding in the heat period. This leads to low conception rates and litter size.

d) A.I. requires extra manpower. Every sow and gilt must be individually handled.

e) Heritable defects of the boar can be spread much more rapidly than with natural breeding.

Balancing the pros against the cons it looks like there will be some interesting things happening in swine breeding in the next few years.



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The bull with the highest official rate of gain by P.R.I. test (Performance Registry International) is a pure-bred Charolais bull (4.82 pounds per day for 140 days). This bull also has the highest yearling rate (1360 pounds at 12 months).

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THE *Cobey* CORPORATION
Galion, Ohio

THE RISE OF THE HEIFER SPECIALIST

(*Continued from page* 63)

like a real chunk of money to take out of the milk check. But when you come to figuring it out, it would cost that much for us to buy the feed to raise heifers right. Benham has the heifers looking good and puts some real size on them. They average about 1,200 pounds when they come fresh."

Francis agreed, "We can concentrate on caring for the milking herd since we let John worry about the heifers. We averaged 13,025 pounds of milk and 469 pounds of fat in 1960 and I know we'll improve on that this year and next."

Heifers On Contract

Benham wanted to set down exactly what risks he would take and what payments he would receive. He used his own ideas, sample contracts, and the advice of his county agent and his lawyer to arrive at eight major provisions:

(1) The Grower, in this case Benham, agrees to take possession of calves listed by ear tag and neck chain number on a description sheet attached to the contract. To make clear which animals were offered and accepted, both Benham and the contractors (in this case the Miller brothers) initial each entry on the list. The Millers provide an average of 23 heifers. Benham takes only animals over four months of age.

(2) The Millers promise to let Benham return their heifers at 30 months of age or before they come fresh. To take individual calves back earlier the Millers must give 30 days' notice. They must notify Benham six months in advance to call the entire contract off, unless both parties agree to quit. They can do that any time.

(3) The Millers pay Benham monthly installments of 35 cents per head per day, due at the end of each month. The total fee is 30 cents per pound of gain, which is calculated when Benham returns a heifer. At that time the difference between the accumulated payments and the charge for the gains is adjusted.

Benham takes the weights on which final payment is based, by

makes 1 TRIP does 5 JOBS

the new 1961 *PASTURE DREAM*

BETTER PASTURES
without destroying the sod

In one "once-over-lightly" action the Pasture Dream (1) prepares the land, (2) fertilizes, (3) builds the seedbed, (4) plants two kinds of seed, including small grain, and (5) packs the soil — all without destroying the sod. Actual USDA figures, available upon request, show that sod seeding saves up to 68% in planting time on each acre of oats. We'll be happy to give you more information about this versatile, money-making tool.

TAYLOR'S 1961 ROTARY CUTTERS
with self-leveling suspension

The Taylor Rotary Cutter for 1961 is all-new, and available in all popular models and sizes. While it cuts, this machine equipped with the optional hay-making attachment windrows as neatly as any rake, piles the hay just right for conditioning. Taylor's self-leveling suspension permits cutting the field as neatly as any lawnmower and prevents scalping.

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putting his loaded truck on the scales. If he is hauling more than one animal he tapes each before shipping to get its approximate weight. He then divides any difference between estimated total weight and true total weight equally among the heifers. This simplifies per head settlement, necessary because Benham seldom trucks the same animals back and forth as a group. The Millers frequently send heifers older than four months, and these necessarily finish their boarding-out period at different times.

(4) All trucking is at Benham's expense. Before transfer, the Millers must dehorn the heifers, or pay for later dehorning. They also pay for shipping-fever shots before pickup. Benham pays for similar shots before trucking the heifers back.

(5) Benham pays for insurance on every animal against fire, lightning and similar accidents while they are in his keep. A four-month-old heifer is insured for $75. The amount of insurance coverage for older heifers increases by $10.50 per month—the price the Millers pay monthly for her keep. Uninsured losses are split, unless they are due to Benham's negligence.

Last year, for example, one of the Millers' heifers was killed by chewing a charged wire. In case the insurance hadn't covered the loss the parties would decide if Benham had been negligent. If so, Benham would stand the entire loss. If not, Benham would have to refund any monthly payments made for the keep of the heifer. The Millers would stand the loss of the heifer.

(6) The Millers retain full ownership of the heifers and all the legal responsibilities that go with it.

(7) Benham binds himself to pasture-breed the heifers to his Holstein bull. Age at breeding is not in the contract. Benham uses his own judgment on that. The contract does state that Benham must have a veterinarian check for pregnancy after the heifers have been with the bull 60 to 90 days.

So far all heifers have conceived. If a negative test ever occurred, the Millers would decide on and pay for any needed treatment.

(8) To keep disagreements out of court, the parties promise to submit any contract issue they cannot settle themselves, to arbi-

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tration. Unless they both want the same individual as judge, each will choose an arbitrator, and these two judges will choose a third. The arbitrators are to present their decision in writing. The contract does not state that this decision is binding. The parties do promise not to renege their obligations until a decision is handed down. Expenses of arbitration are to be shared equally.

This clause sounds ominous, but actually the Millers and Benham regard the contract more as a guide than a rigid directive. For example, the contract makes no mention of veterinary bills. Benham assumes them as part of overall care. Recently he paid without question a $40 bill for treating a growth in a heifer's throat.

Both parties realize the contract is not free from loopholes, but the Millers say quite expressively that the clause in the contract providing the most surety is the name of the other party. If he is able and honest, other provisions are easy to adjust.

Benham uses the description sheet mentioned in his contract as a complete record on each animal he raises. He enters the date it was received, its birth date, breed, weight on entry, and date turned with the bull. There also are blanks for date of pregnancy check, date returned, and weight on return.

The contract between Benham and the Millers has run only little more than a year. The first group of heifers Benham took in included many calves considerably older than four months. Some of these are now coming fresh. A heifer which recently graduated from Benham's rolls was 14 months old when it arrived. It weighed 843 pounds then and gained 357 pounds in 13 months.

Benham figures grain costs at the current market price. While he fed the 14-month-old heifer to near-freshening, the value of his grain supplement (ground corn and oats) was two cents per pound. Her share of the concentrates (240 pounds) cost $4.80, her silage ration for seven months cost about $28 and the value of the green chop she ate for six months came to $15. Using the rule of thumb that feed costs are 60 percent of the total cost of feeding a heifer, Benham's expenses were roughly $80.

The Millers had paid installments worth $126 up to the month the heifer was returned, but owed only $107.10. Benham had to refund $18.90. He estimates that the installments will tend to equal the fee per pound of gain more closely once heifers stay in his care the full 24-month period.

Calves Without Contracts

This year Benham added 140 non-contract calves to the 23 Miller heifers and his 35 milking cows, to earn enough for himself and his hired man to make a living. Forty of the extra heifers are being raised for Benham's landlord as an investment. Eleven others are intended for vealers. The others are dairy replacements Benham bought for later resale to dairymen.

The "milk factory" operated by Jim and Don Banker of Avon, New York, provided part of the calf purchases. Benham agreed

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to give the Bankers first choice in buying back their heifers at the prevailing price when they were grown. This offer is attractive to the Bankers, as they have had to shop around in the past for the replacements they need. Now they can get professionally-grown calves from their own high-producing herd at a fair price.

The Bankers, as well as other dairymen in the area who are increasing herd size, would be agreeable to a contract, provided Benham raises heifers from the start. "If I went along with that," Benham said last spring, "I could fill up the place with calves, one-two-three. To care for 400, as I'd like, I'd need one more building. I'd probably build a new barn for the youngest ones, because there's been some trouble with scours in the converted buildings I've been using."

Whatever his final decision will be on the question of contract heifers under four months of age, Benham feels that first-hand experience with the young, purchased calves will be valuable to establish some cost figures and to find ways of cutting them.

One possible method to cut costs is an electronic calf feeder for feeding calves under four months old. The feeder, called Nurs-Ette by its fabricator, K & K Manufacturing, Inc., Minneapolis, cost about $340. The hopper holds 25 pounds of milk replacer—enough to feed 15 young calves for 24 hours.

The machine runs electrically on a regular 110 to 115-volt A. C. current. A mixer draws water from any normal-pressure cold waterline and automatically makes up fresh, warm formula in pint batches. When a calf drinks down the pint, the mixer starts on another cycle. Well-fed calves usually lose interest in the machine before the next portion is ready, giving another animal a chance to drink. "This way," Benham said, "the formula stays fresh and calves don't overfeed. Calves take to mechanical feeding easily. I started them off by guiding their mouths to the white nipple on the feeder.

"If this machine works out, it'll help me save floorspace in any calf barn I build," Benham went on. "I can pen 15 calves together, where three calves per pen was the maximum with pail feeding. I think 20 square feet per calf will be enough. That's a saving of about a third."

Benham buys the 15 percent fat and 28 percent milk protein formula put out by K & K for the mechanical nurse. He uses about $2 worth of replacer per calf each week. He also has free-choice grain available at all times.

Management of Older Calves

The various buildings on Benham's farm house the older calves in four age-groups. The youngest group, 4 to 10 months old, gets a ration of second-cut alfalfa hay supplemented with four pounds per head of a mix containing 50 percent corn and cobmeal and 50 percent oats. Benham adds one pound of minerals per 100 pounds of

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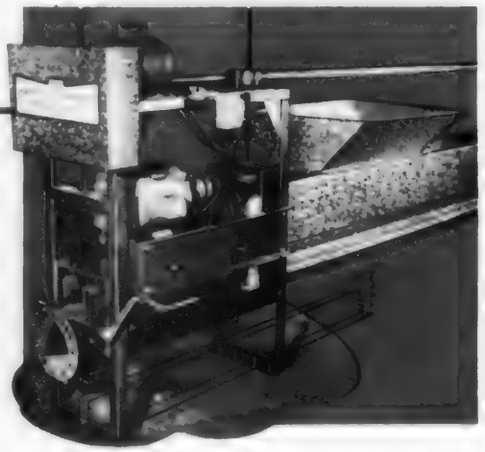

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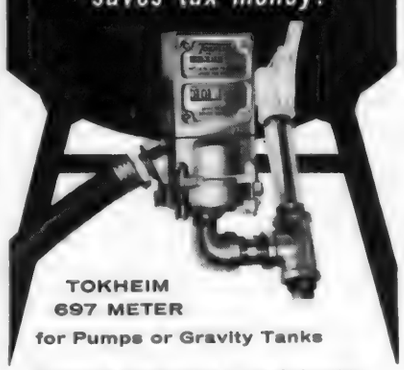

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concentrate. All these calves are vaccinated against brucellosis.

The group 10 to 16 months old is fed from grass and corn silage stacked next to the barn. Benham feeds this daily from a self-unloading wagon and tops it with ground corn and oats. All his calves except the oldest group are fed from storage winter and summer.

When calves are about 16 months, they are moved to the breeding lot. Benham said he makes the decision to turn an animal in with the bull not so much on age as on weight. He sets 850 pounds as his ideal for Holsteins. For two months these animals get corn and grass silage only—no supplement. Benham has enough grain in the silage to keep heifers in good condition.

Bred heifers get the silage mix in winter and green chop in the summer. Some of them run with Benham's milking herd if their own barn gets too crowded.

Variations

A contract slightly different from Benham's is used by Robert Davenport, a tall young man just starting out in the dairy business in Washington, Connecticut. His 70 animals on contract include dry cows as well as heifers, which is part of the cause for the variation.

The cows, which get hay supplemented by pasture, are carried for a flat charge of $11.25 per month. If the owner wants the hay supplemented he furnishes the grain.

The main difference in the contract is the variable fee. Final settlement of the monthly installments of 25 cents per head per day is adjusted to changes in the market price for heifers. The base rate is 20 cents per pound of gain. Then for every $15 change from a quotation of $250 in the market for fresh or near-springer heifers a differential of one cent per pound is applied. With the local price of grade heifers of this description at $325 last spring, the contract fee for growing heifers was 25 cents per pound. Davenport plans to get this contract rate adjusted upwards as it does not quite cover his labor and expenses. A fee likely to be acceptable to himself and his customers is 26 to 27 cents per pound of gain for heifers and $12 per head per month for dry cows. Under conditions last spring, the base rate for heifers would have to be 22 cents to bring the adjusted fee to 27 cents.

On the other side of the continent from Davenport, California specialists with longer experience have developed contracts with further variations. Leonard Valk of Oakdale, for example, gets a straight monthly fee for boarding calves over four months old. He charges $6.25 per month, or a bargain rate of $72 per year. He weighs the heifers every month to check rate of gain, which averages two pounds a day on heifers with a good frame. He calculates the most profitable animals net him $25 each on a 22-month feeding program.

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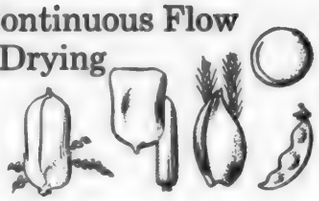

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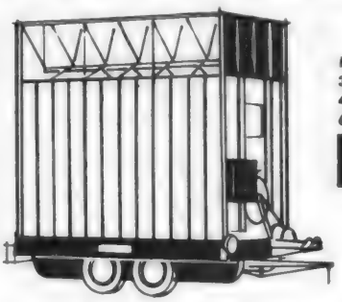

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both a flat monthly fee and a charge per pound of gain. W. T. Howell raises calves on contract from near birth to one year. His fee is $7.50 per month per head, plus six cents per pound of gain due at the end of the year. Howell said the monthly fee covers feed and veterinary bills. The extra six cents are for labor and management.

A Cost-Plus Program

Ray Goodman, in charge of heifer-raising at the Triangle Ranch near Modesto, California, has a knack for precise recordkeeping. He calculates the exact cost of raising each lot of heifers he handles. In 1959, the last year for which he has complete figures, it cost him $342.74 on the average to raise a heifer. All the animals he handles are Holsteins. His books carry separate entries for age groups between 3 to 5 days and seven months old, for calves seven months to breeding age, and for calves between breeding age and 24 to 28 months.

For example, his group under seven months old (the calves weigh up to 410 pounds) averaged expenses of $80.30. This included charges totaling $52.86 for purchased and homegrown feed, $5.54 for vaccine, $13.50 for labor, $4.40 for cull- and death-losses, and $4.00 for equipment, buildings and other expenses. Similar expense sheets added to $118.35 for the middle age group, and $144.09 for the oldest.

These costs, plus six percent for a management fee, make up Goodman's total bill.

He makes no formal contracts. At the end of the growing period the customer can look the animals over. If he wants them all for replacements he takes them home. If he just wants the best-looking heifers, Goodman will market the rejects for an additional fee.

Goodman works toward developing what he calls a heifer's "built-in feeding capacity." He explained, "I believe in growing out heifers so when they come into production they will immediately begin to make a return on investment and not use up feed for more growth and development. To get production from a heifer you must raise her properly. A few extra dollars spent at the right time on raising a heifer, can double her life income. We build dry-matter capacity into a heifer without making her fat, by using a controlled protein and carbohydrate ration. Her gain should be continuous, and we watch to see it is."

Goodman's customers say his management gets results. Joe Pierce of San Jose is now milking 121 head of Goodman heifers. The last 26 head finishing their first lactation averaged 15,619 pounds of milk and 575 pounds of fat on twice-a-day milking, using a 305-day equivalent. Two of these heifers produced over 700 pounds of fat, the next seven produced over 600, 14 over 500 and the bottom three over 475. "At that rate," Pierce said, "these heifers pay for themselves fast."

Goodman and fellow specialists in California and in dairy regions spread over the nation are proving to their customers that it pays to use their services. Whether the best deal is a contract or a neighborly agreement, or whether the fee is per pound or per month, depends on individual preferences or local variations. The appeal of the basic service, however, is widespread. It is a modern answer to problems of raising replacements due to lack of feed, space or labor.

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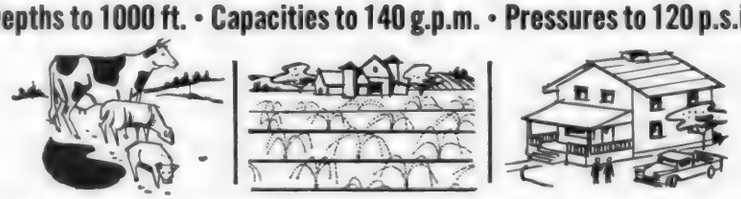

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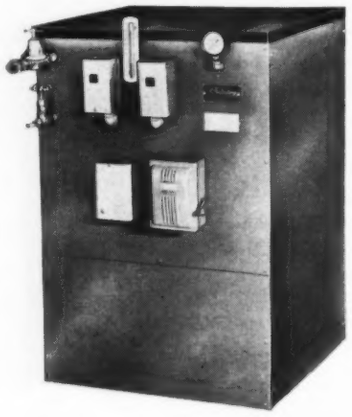
THE LAST WORD

H_2O Pasteurizer No question there is a water problem in many rural areas. When FQ ran an article on an electric pasteurizer (Autumn '59) the response to the offers of construction plans was tremendous. Now a company in Tennessee is offering the pasteurizer for sale at slightly below the price we estimated a farmer could build one himself.



The Electric Furnace Corporation, 505 Cherokee Blvd., Chattanooga 5, Tenn., will sell the pasteurizing unit for $450.00 f.o.b. Chattanooga. It comes in a 25x26x40-inch cabinet, and pasteurizes water using the same process as for milk—15 seconds at 161° F. The water is safe to drink, and there is no chlorine taste which so often spoils chemically-purified water. A five-month test in Warren County, Kentucky, showed the operating cost to average 39 kilowatt hours per 1,000 gallons of water.

The pasteurizer doesn't filter the water, or pump it, and so a conventional filter and pumping system are necessary. It produces pasteurized water at one gallon every three minutes, a slow rate for peak periods, so a storage tank for pure water is needed. The company has plans for a layout. The unit is guaranteed for a year, but the pasteurizer is a simple design, and life should be as long as normal plumbing with average care.

Double Test There has been a lot of talk in recent years about synthesizing performance records and show ring standards. The Red Angus Association is the first group actually to do anything about it. Every Red Angus that walked into the ring at the Fort Worth Fat Stock Show last winter had official performance records behind it. These records certified the individual's adjusted 205-day weaning weight, its average daily gain on feed test, and overall weight per day of age. The older bulls had been through a 140-day feed test; the older heifers had completed a 112-day feed test.

Those animals whose performance records put them among the top third were identified in the ring by a blue mark on the exhibitor's number card. The middle third had a red mark on their cards. The bottom third carried no mark at all. According to the rules, only the blues were eligible for Grand Champion. The reds could win in their respective open classes but could not be placed higher than Reserve in the final judging. Those in the bottom third, no matter how fine their conformation and condition, were ineligible to win any class, though they could be placed as high as second.

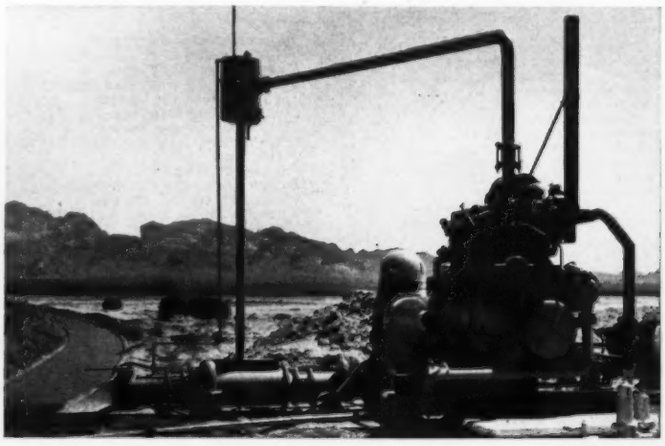
L. A. Maddox, of Texas A. and M., judged the show. How did he like these standards? "I think the idea has a lot of merit," he said, after he had picked George and Vernice Chiga's Tuscarora Chief, 2142B, as Grand Champion Bull and Beckton Stock Farm's Beckton Pine Marie CPL,1937B, as Grand Champion Female.

"I don't know what would happen if the reds won all the classes," he went on. "I guess you'd just wind up without a Grand Champion. But I suppose that possibility is remote and I think that with some more refinement this system has a lot to offer."

Sense of Smell In an effort to work with nature, farmers have begun to make use of animals' keen sense of smell to control them. In general the technique is either to attract, repel, or confuse the beasts. Confusion was the method used on the Case ranch of Great Bend, Kansas, recently when Case and his wife LaVern went to the lambing barn to find it filled with newborn bawling lambs—all of them unclaimed by their mothers. "We were a little shook," Mrs. Case reports. "We couldn't decide who belonged to who. On the theory that the ewe claims her lamb by smell, I went to the house and came back with a can of Johnson's Glade Spray. We sprayed each ewe's nose and sprayed the lambs all over, then penned each ewe with a lamb or two for a couple of days. All the adoptions—if they were adoptions—worked well. Since then we've had no orphan lamb problem—we leave the foster mother and the adopted lamb smelling like a bouquet and by the time they begin to smell like sheep again they're inseparable."

Farmers and ranchers in the West are using scents to help their fences keep deer and elk out of their pastures and orchards. This repellent, made by the Pacific Scent Company to duplicate the smell of mountain lions, is dribbled on fence posts or used to saturate cotton balls which are then hung around the field. A California orchardist, who used this *eau de lion* on cotton balls hung at about three-foot intervals on bushes around his orchard, said, "The lion smell made an effective barrier, but we learned you must spray the balls every day or two. When we failed to spray for a week, the deer came back; we resumed spraying and they stayed away."

The notoriously keen sense of smell of the dog is being used in Texas to hunt out cattle with screw worms in the brush country. Now, cattlemen are wondering whether or not we can use dogs to solve one of the hardest problems of artificial insemination on range cattle. Can they be trained to ferret out cows in heat?



A natural gas-operated Caterpillar engine is one of several makes used by Arizona Service Company to supply pure horsepower for irrigation.

Selling Horsepower Irrigators in three counties in Arizona are the customers for a new departure in power sales. The Arizona Public Service Company is now selling them pure horsepower instead of the natural gas to run the engine on their irrigation pump. The company supplies and installs the gasline, engine, gearhead, and accessories. The company also assumes full responsibility for service and maintenance. The farmer is billed for horsepower which is measured as it is actually delivered to the pump shaft. Advantage to the farmer is reduced investment in pumping equipment and reduced pumping cost. Advantage to the company is increased use of gas during the normally low summer season. Comparative costs show the farmer is spending 10.5 mills per kilowatt hour for electricity plus purchase and maintenance of electric pumping equipment, as against 9.35 mills for the equivalent amount of power bought as horsepower. Since Arizona Public Service sells both gas and electricity, they are in an excellent position to collect and evaluate cost figures.

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